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The Political Economy of Agricultural Pricing Policy

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Abstract

Government intervention in agricultural prices--particularly in producer and consumer prices of rice, the staple food--persisted throughout the period 1960-84 in the Republic of Korea. During that period, the country largely completed its transformation from an agrarian economy to an industrialized one. In 1960, agriculture's share of gross national product (GNP) was 36.5 percent, and agriculture accounted for 60 percent of the country's employment. By 1984, agriculture's share of GNP was only 13.9 percent, and its share of employment had fallen to 25.9 percent.

In the mid-1950s, Korea's centralized government concentrated on rebuilding the country, heavily damaged by the 1950-52 conflict. Later in the decade, and on into the 1960s, Korea turned its attention to expansion of industry and trade, and was highly successful. On average, national GNP increased more than 8 percent a year between 1960 and 1984, while the value of exports increased an average 30 percent a year.

Initially, the great amount of attention paid to the industrial and trade sectors had negative effects on the incentives for agricultural production. In 1962, for instance, trade and exchange rate policies (i.e., indirect intervention in agricultural prices) led to negative effective rates of protection (ERPs) for rice (-29.2 percent), barley (-27.7 percent), soybeans (-28.6 percent), and beef (-35.4 percent).

Early in the 1970s, however, various factors--including a high rate of migration from the countryside to the cities, rising prices for grain imports, and an increasing differential between urban and rural

wages--caused the government to adopt a more favorable attitude toward the farm sector. The ERPs for agriculture turned positive in the 1970s, and continued to climb in the first half of the 1980s. During the period 1980-84, total (direct plus indirect) effective intervention in agricultural producer prices was a positive annual average of 74 percent for rice, 91 percent for barley, 178 percent for soybeans, and 111 percent for beef. Only pork (at -5 percent) continued to show a negative rate of total effective protection. The high positive rates for the first four products were the outcome of two different trends: a steady rise in direct positive protection for agriculture, and a gradual decline in the negative effects of indirect intervention (particularly when compared to the rates of such intervention in most other developing countries).

Notwithstanding its increasingly favorable policies for agricultural producers in the 1970s and 1980s, the government also sought to keep consumer food prices stable, and there were many years when consumer food prices were less than border (i.e., world) food prices. During those years, the government subsidized both the prices received by farmers and the prices paid by consumers.

Government intervention in agricultural prices had effects on agricultural production, agricultural consumption, foreign exchange earnings, the government's budget, and wages and income in both the rural and urban sectors. Those effects are also presented in this report.

Table of Contents

Chapter 1

AN OVERVIEW OF THE ECONOMY AND AGRICULTURAL SECTOR OF THE REPUBLIC OF KOREA

The Republic of Korea (hereinafter Korea or South Korea) is situated in the southern half of the Korean peninsula and has a total land area of 99,118 square kilometers. It is surrounded by the Yellow Sea on the west, the Strait of Korea on the southwest, and the Sea of Japan on the east. The country is separated from the People's Democratic Republic of Korea (hereinafter North Korea) by a military demarcation line about 30 miles north of Seoul.

Korea is a hilly and mountainous country with only about 22 percent of the total area under cultivation and about 12 percent in urban and industrial uses, highways, and other nonclassified uses. About 66 percent of its land area is classified as suitable only for forestry, grazing, or other extensive land uses.

Korea had a population density of 416 persons per square kilometer in 1984. Its population growth rate declined from 2.9 percent in 1960-61 to 1.9 percent in 1970-71 and to 1.5 percent in 1983-84. This was one of the most rapid declines in birth rate ever recorded in developing countries. A government program of family planning, combined with changes in economic opportunities and attitudes toward family size, helped to bring this about. Korea, however, still faces a serious problem of population pressure on limited space.

Its estimated 1986 population of more than 43 million lives in a country of only 38,000 square miles.

Rapid urbanization has been one of the most conspicous characteristics of the third quarter of the twentieth century in less developed countries, and Korea is no exception. Although an accurate figure of population transfer out of rural areas is hard to ascertain, one estimate indicates that almost half a million rural people moved to urban areas every year, or a total of more than 15 million, during the 1955-84 period. In Korea, urbanization (defined as the rate of growth of the percentage of population in cities of over 50,000) has proceeded at an annual rate of 4.1 percent. This high rate of urbanization has been closely linked to the rate of economic growth, particularly of the urban-oriented manufacturing and service sectors.

The rapid increase in non-farm employment has resulted in a significant change in the structure of employment in Korea. Non-farm employment, which accounted for less than half of total national employment until the late 1960s, surpassed farm employment in the early 1970s. Moreover, the absolute level of farm employment began to show a decline after 1976. The rapid increase in non-farm employment was almost entirely absorbed by the manufacturing, government and service sectors. The expansion of employment in non-farm sectors would not have been possible without South Korea's increased investment in education. Table 1 shows the average number of years of schooling in selected years between 1960 and 1984. According to the table, the average education level of the labor force increased gradually from about 4 to 12 years of

Table 1. Population, Labor Force, Educational Level and Arable Land

Year	Population					Arable Land per Person Employed in Agriculture
	Total	Urban[a/]		Rural	Urban as % of Total	
		Total	Concentration[b/]			
	(1000)	(1000)	(%)	(1000)	(%)	(ha)
1955	21,502	5,281	81.3	16,245	24.6	0.30
1960	24,994	6,999	82.8	17,995	28.0	0.29
1965	28,705	12,893	58.3	15,812	44.9	0.49
1970	32,241	17,819	61.0	14,422	55.3	0.47
1975	35,281	22,037	62.5	13,244	62.5	0.41
1980	38,124	27,297	62.8	10,827	71.6	0.47
1984	40,578	31,563	60.8	9,015	77.8	0.55

Table 1. (Cont.)

Year	Labor Force				Educational Level[c/]		
	Total	Non-farm	Farm	Non-farm as % of Total	Non-farm	Farm	Average
	(1000)	(1000)	(1000)	(%)	(No. of Yrs)	(No. of Yrs)	
1960	8,521	1,746	6,775	20.5	6.3	3.0	4.2
1965	8,859	3,889	4,970	43.9	7.6	3.8	5.4
1970	10,199	5,150	5,049	50.5	8.6	4.2	6.4
1975	12,340	6,997	5,343	56.7	9.0	4.9	6.9
1980	14,455	9,786	4,669	67.7	9.8	5.0	8.0
1984	14,984	11,103	3,881	74.1	12.7	8.2	11.5

Source: Economic Planning Board, Korea Statistics Yearbook, various issues.
Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook
Farm Household Economy Survey, various issues.

a/ Population in cities of over 50,000 persons.
b/ Ratio of population of 10 largest cities to total urban population.
c/ In terms of the number of years of schooling.

schooling during the period. The table also shows that the average education level of the labor force in the non-farm sectors is significantly higher than that in the farm sector. The gradual rise in the average education level enabled Korea to meet the rapid increase in non-farm employment without experiencing any shortage of skilled workers until the early 1980s.

Economic Performance

Since the early 1960s, the Korean economy has recorded sustained high growth, only interrupted by a few years when production temporarily declined. Real GNP in Korea grew at an average annual rate of 8.4 percent during the 1962-84 period. Even during the 1974-75 period of worldwide recession, Korea managed to attain a relatively high rate of growth of 7 to 8 percent.

Per capita GNP in 1975 constant prices increased from US$155 in 1962 to US$1,124 in 1984, more than a sevenfold increase. The rapid growth of per capita GNP was, of course, largely attributable to the rapid growth of output, but it was also facilitated by the gradual decline in the population growth rate.

The sustained growth in GNP between 1962 and 1984 was largely the result of an export-oriented industrialization strategy. Until the early 1960s, exports were still only 2 percent of GNP. Thereafter, the rate of export growth surpassed that of GNP growth. Merchandise exports amounted to only US$55 million in 1962 but increased to US$1,624 million in 1972, for an average annual growth rate of about 40 percent. Between 1972 and 1984 they increased at an average annual rate of about 30

percent. In contrast, imports of goods and non-factor services grew much more slowly, showing an average annual growth rate of about 17 percent during the 1962-84 period (see Appendix 1). The nominal value of merchandise exports in 1984 reached US $29.2 billion, or roughly 36 percent of GNP.

Economic growth and export expansion required a sustained increase in domestic capital formation. Gross domestic investment was less than 15 percent of GNP until the mid-1960s, but thereafter it increased fairly steadily, rising to nearly 30 percent in the 1970s and reaching a high of 31.5 percent in 1980.

To finance this increase in gross domestic investment, the country had to import a significant amount of foreign capital. The inflow of foreign savings has fluctuated from year to year, depending upon the balance of payments situation and the domestic saving/investment gap. The ratio of foreign saving to GNP increased from an average 7.7 percent in 1954-56 to nearly 10 percent in 1961-63, declined to 6.6 percent in 1971-73 but increased again to almost 7.6 percent in 1981-82, due mainly to the sharp increase in world oil prices (see Appendix 2).

On the other hand, domestic savings increased fairly slowly, from about 5 percent of GNP in the mid-1950s to over 7 percent in the mid-1960s. Savings then increased rapidly to 17 percent in the early 1970s and over 20 percent in the early 1980s.

The rapid expansion of gross domestic investment from the mid-1960s was largely made possible by the increase in domestic saving.

Table 2. GNP, Investment and Savings, and Imports and Exports, for Selected Years

Year	Real GNP		Per Capita GNP		Share in GNP of			
	'75 Const. Price	In US$	Nominal	Real[a/]	Investment	Savings	Imports	Exports
	Billion Won	Million US$	US$	'75 Const.$	%	%	%	%
1955	2,423	1,395	65	134	12.3	5.2	24.1	1.3
1960	2,846	1,948	79	144	10.9	0.8	17.2	1.6
1965	3,885	3,006	105	177	15.0	7.4	15.4	5.8
1970	6,363	7,986	248	341	26.8	17.3	24.8	10.5
1975	10,092	20,852	591	591	30.0	19.1	34.9	24.4
1980	14,359	61,203	1,605	1,130	31.5	21.9	36.4	28.6
1984	18,979	81,073	1,999	1,124	30.0	27.4	37.8	36.1

Source: The Bank of Korea, National Income Statistics, various issues.

a/ Nominal US dollars deflated by the US WPI (1975=100.0).

Prior to the first five-year economic plan (1962-66), only about 30 percent of gross domestic investment was financed by domestic savings. That share rose to 34 percent in the early 1960s and to 75 percent by the early 1970s. During 1975-78 the share rose as high as 92 percent before declining to about 70 percent by the early 1980s.

Relative Importance of Agriculture

Until the early 1960s, Korea was a typical agrarian country, with almost half of its GNP generated by agriculture and an overwhelming portion of its population engaged in farming. But a vigorous industrialization and export drive undertaken in the early 1960s rapidly transformed the character of the economy. Between 1960 and 1984, agriculture's share of GNP declined from 36.5 percent to 13.9 percent, while its share of total employment declined from 60.2 percent to 25.9 percent. While total GNP expanded at an average annual rate of about 8 percent, the agricultural sector grew at an average of about 3.5 percent during 1960-84 (see Appendix 3).

Of the total increase in GNP of 15,908 billion won between 1962 and 1984 (in constant 1975 prices), agriculture contributed 1,312 billion won, or roughly 8.3 percent. The manufacturing sector accounted for 34.5 percent of the total increase in GNP, while the remaining 57.2 percent came mainly from the SOC and service sector, particularly trade (see Appendix 4).

Although agriculture's growth rate of 3.5 percent annually appears not unfavorable compared with the population growth rate of 1.6 to 2.8 percent during 1962-84, production of agricultural products did

not rise rapidly enough to keep pace with the expanding demand resulting from population and income growth. Although self-sufficiency in rice had been nearly attained by the early 1980s, overall self-sufficiency in all grains declined from 94.5 percent in 1960 to 48.9 percent in 1984. In the cases of wheat and feed corn, Korea is completely dependent on imports. Imports of wheat have remained relatively stable in recent years at a level of 2 million metric tons a year, but imports of feed corn have been increasing. Between 1965 and 1984, such imports increased from 60,000 to 3.2 million metric tons. Korea was self-sufficient in soybeans until the mid-1970s, but the rate of self-sufficiency had declined to 24.0 percent by 1984 (see Appendix 5).

In 1965 the total value of grain imports amounted to US$51 million; by 1984 the total value was US$1,250 million. If non-grain food imports are added, the country was spending US$1.6 to US$2.0 billion in the early 1980s for imports of food, which were roughly 5 to 8 percent of total imports.

Table 3. Relative Share of Agriculture in GNP, Employment, Imports and Exports for Selected Years

Year	Share of Agriculture in		Agricultural Imports		Agricultural Exports		
	GNP	Total Employment	Level	Share in Total Imports	Level	Share in Total Exports	Share in Total Agri. Output
	%	%	Billion US$	%	Billion US$	%	%
1955	43.9	na	68	19.9	1	5.5	0.1
1960	36.5	60.2	32	9.3	4	15.2	0.3
1965	37.6	56.1	64	13.8	15	8.6	1.3
1970	26.4	49.5	319	16.0	30	3.6	1.3
1975	24.7	43.3	947	13.0	176	3.5	3.4
1980	14.4	32.3	1,797	8.1	459	2.6	5.2
1984	13.9	25.9	1,622	5.3	489	1.7	4.3

Source: The Bank of Korea, Economic Statistics Yearbook, various issues.
Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.
The Bank of Korea, National Income Statistics, various issues

Table 4. Agricultural Food Production
(1974-76=100.0)

Year	Production	
	Total	Per Capita
1960	54.09	78.86
61	60.19	86.30
62	53.65	74.40
63	59.27	80.26
64	69.87	91.96
65	69.87	89.45
66	74.49	93.63
67	71.12	86.11
68	71.12	84.44
69	81.72	94.47
70	80.48	90.29
71	81.10	88.62
72	82.15	87.78
73	83.92	87.36
74	88.88	90.70
75	100.84	100.86
76	100.28	108.45
77	118.58	114.75
78	127.05	121.08
79	131.44	123.43
80	106.65	98.72
81	118.84	108.46
82	121.10	108.99
83	125.10	111.04
84	129.18	113.09

Source: FAO, Production Yearbook, various issues.

An Overview of Government Intervention

Since the early 1960s, Korea has been governed by a highly authoritarian and centralized government which has identified economic growth as its principal objective. The course of development has been shaped in large part by top-down planning mechanisms and policy formulation by a relatively few decisionmakers. The government has full authority to use any type of instruments and policies whenever considered useful, with the result that the public sector has accounted for a larger share of value added than is true of a number of developing countries. The mode and the instruments of government intervention are discussed here under six categories: government expenditures, trade regime, capital market, labor market, public enterprise, and price and foreign exchange controls.

Government Expenditures. Government expenditures as share of GNP have fluctuated widely. Government expenditures and revenues, and their effects on the fiscal deficit, are presented in Appendix 7. Government expenditures expanded during the Korean War and leveled off in the immediate postwar period. They were again expansionary from 1956-58 but contracted as part of the stabilization effort from 1958 to 1960. A rise in government spending and the fiscal deficit in 1961-67 contributed to inflation. From 1968-72, expenditures were fairly constant in the range of 18-20 percent of GNP, but the deficit grew as revenues stagnated and then declined.

An export boom and the oil crisis in late 1973 combined to inject demand-pull and cost-push pressures into the economy that

overwhelmed any contractionary effect of restraint on government spending. These external factors became the predominant causes of instability throughout the 1970s as variation in the rate of government spending became less significant. The amplitude of swings in the expenditure ratio diminished, and a rise in both the export ratio and fluctuations around the trend of that ratio became the dominant factors in aggregate demand (Mason, et al. 1980).

Trade Regime Intervention. Because of South Korea's lack of natural resources and the relatively small size of its domestic market, the country had to heavily rely on foreign trade in the process of industrialization. A high rate of inflation in the 1960s brought about a situation in which the official exchange rate, despite periodic devaluations, consistently overvalued domestic currency. The government undertook various ad hoc measures to alleviate excessive demand for imports and to offset disincentives to exporting industries. A complicated structure of multiple exchange rates was also developed to alleviate balance of payments difficulties. An import licensing system was adopted on the basis of a semi-annual trade program that designated items eligible for import, and basic tariff rates w re imposed. These tariff rates ranged from zero to over 100 percent and encouraged import substitution, mainly in the consumer goods industries.

In an attempt to reduce the export disincentive effects of currency overvaluation, a preferential export system was instituted which granted successful exporters of specified commodities the right to import popular items. An export credit system was also put into

effect. On the other hand, interest rates in the financial markets were also controlled in order to accelerate private long-term investment by keeping the cost of capital to investors low, since it was generally felt that aggregate domestic savings were not very responsive to changes in interest rates.

In May 1964, the government devalued the official exchange rate from 130 to 256 won per US dollar and announced that the existing fixed exchange rate system would be changed to a unitary floating system. The government then gradually alleviated nontariff barriers on imports by increasing the number of importable items in semi-annual trade programs. But even after the 1964 exchange rate reform, the government had to grant direct subsidies to certain commodity exports, since the official exchange rate was considered unfavorable to export promotion.

Among these export incentives were (1) tariff exemptions on imports of raw materials for export manufacturing; (2) exemptions from domestic indirect taxes for both intermediate imports used in export production and for export sales; (3) direct tax reductions on income earned from exports and other foreign exchange-earning activities; (4) tariff and tax exemptions for domestic supplies of intermediate goods used in export production; (5) wastage allowance subsidies; (6) low-interest rate preferential loans for exports; (7) local letters of credit and standby credit (Westphal and Kim, 1982).

Export incentives were reduced, however, beginning in 1973, when reductions in direct taxes on profits from exports were abolished. Wastage allowances were decreased over time, and exporters

are no longer entitled to discounted utility rates. The credit subsidy to exporters decreased as there were continued reductions in general interest rates, and the subsidy was finally eliminated in 1982 (Yang, 1986).

Also, the government took steps toward import liberalization by reducing both tariff and non-tariff protection of domestic industries. Nominal tariff rates prior to the early 1980s were in the range of 5-30 percent for most raw materials, 20-50 percent for most intermediate goods, and 40-80 percent for most final goods. A new tariff law passed in 1983 set norms of 5-10 percent for raw materials, 20 percent for intermediate goods and 20-30 percent for most final goods. At the same time, the government announced its plan to raise the import liberalization ratio to 95.2 percent by 1988, when most manufactured goods were to be off the restricted import list. The government has given domestic industries notice that they must prepare themselves for continued liberalization of the domestic market (Koo, 1986).

Capital Market Intervention. Monetary policy in Korea has served as almost the sole tool for controlling aggregate demand. The annual financial stabilization program, which focuses on monetary management, specifies year-end money supply targets along with coordination among short-run stabilization policies. Monetary authorities have had to rely on direct control measures -- ceilings and quotas on loan programs, changes in required reserve ratios, manipulation of the deposit money banks' stabilization accounts with the central bank, and forced sales of stabilization bonds to the banks and institutional investors. Traditional instruments, such as open market

operations, could not be utilized because of the absence of well-developed capital markets. But control of the official interest rates has resulted in fragmented markets for many financial assets and uneven flows of funds among the markets.

Deposit money banks, which dominate Korea's capital markets, have been no more than banking branches of the government, whose main role is to mobilize deposits and allocate resources and new credit supplied by the central bank to the sectors, industries, and even individual borrowers designated by the government. The portion of lendable resources that banks could allocate on their own discretion has been very limited. In recent years, more than 50 percent of the deposit money banks' total loans were classified as "directed policy loans" whose volume and allocation were determined by the government itself, often independently of monetary stabilization (Park, 1984).

Labor Market Intervention. The labor unions in Korea have not been effective in raising the level of real wage rates or in improving working conditions. The relatively free system of collective bargaining which began to unfold in the 1960s was suspended by the 1971 Special Law on National Security, a law which remains in force today. Under the law, labor unions are required to secure government approval prior to engaging in contract negotiations with management, and all strikes are prohibited.

Numerous labor disputes occur each year, mostly involving issues of worker rights rather than wages or working conditions. Moreover, unions are restricted to only a few industries, such as long-

established textile companies. Employees of public enterprises, such as the railway, telephone, and electricity corporations, are regarded as civil servants and are not permitted to strike. Among the newly emerging giant corporations, only a few have been unionized. Labor unions seem to be effective in providing job protection for their members, and the government's attempts to introduce labor-saving machines have often met strong resistance from labor organizations fearing employment reduction.

It was market forces, not labor unions, that were responsible for wage increases up to the late 1970s. Because of the existence of an abundant labor supply during the initial stages of economic development, real wages did not rise as much as labor productivity. During the 1960s the real wage rose only 5.8 percent per year, compared to a 12.0 percent increase in the labor productivity index. From the mid-1970s, however, the increase in real wages surpassed the rise of the productivity index. A pattern of sharp wage hikes prevailed for three consecutive years before a sharp drop caused by the second oil shock.

In the late 1970s the government became concerned about the possible impact of wage increases upon South Korea's competitiveness in international markets. This concern led to the establishment of wage guidelines. The rationale was that stable wages were essential for export competitiveness because many of Korea's exports were still labor-intensive. Although the guidelines were effective in controlling the wage rates for civil servants and the employees of government-controlled banking institutions, they were not effective for private firms. The

guidelines, however, did have an indirect psychological impact upon labor and management (Kim, 1976).

Public Enterprise. Although South Korea is generally thought of as one of the most capitalistically oriented countries in the Third World, it still has a large public enterprise sector. Public enterprises (railway, electricity, telephone, tobacco, coal, etc.) constitute a "leading sector" in the national economy. From 1970 to 1980, value added in this sector grew at the rate of 14.5 percent a year, while the total economy was growing at 9.5 percent and the non-agricultural sector at 12.2 percent. During these years the public sector absorbed about 25 percent of annual gross investment.

Since public-enterprise goods and services are usually priced to cover costs and yield a profit, the private enterprises purchasing these goods and services are not indirectly subsidized, and the earnings of public sector enterprises make a sizable contribution to government revenues. Revenue from the government's tobacco monopoly alone accounts for about 7 to 8 percent of total government revenue each year.

Approximately 10 percent of the value added by public enterprises has been sold in competitive markets. Public-sector enterprises are generally characterized by high capital intensity, large size, market concentration, and the production of import substitutes rather than exports (Mason et al., 1980).

Inflation.1/ South Korea's average annual growth rate of over 8 percent during the period 1962-84 has been remarkable by international standards, but the same can hardly be said about inflation. Measured by the wholesale price index (WPI), inflation was more than 16 percent per year on average, and ranged from a low of 0.2 percent to a high of 42.1 percent. On the basis of the GNP deflator the rate of inflation was even higher, at 18.6 percent per year.

During the 1961-64 period, the average annual rate of inflation was almost 20 percent in terms of WPI, or 23 percent using the GNP deflator. The main sources of inflation during this period were numerous government measures to stimulate economic growth and two years of crop failure. In 1964, the government undertook an almost 100 percent devaluation of the won against the US dollar. Although this reform helped to improve Korea's export competitiveness, it had a devastating effect on general prices, which surged more than 35 percent that year.

The years between 1965 and 1973, on the other hand, were a period of outstanding performance characterized by relative price stability and rapid growth. Output grew at an average annual rate of 10 percent, while price increases measured by the WPI averaged about 8 percent (15 percent on the GNP deflator).

The world resource crisis of 1973 returned the rate of domestic inflation to a level almost comparable to that of the early 1960s.

1/ This section is drawn from Park (1984).

Since Korea is heavily dependent on imported oil, oil price increases during the 1976-79 period caused more than a 20 percent deterioration in Korea's terms of trade. Bank credit was expanded by nearly 50 percent to help finance imports. As a result, wholesale prices rose by 42 percent in 1974, the largest increase since the 1960s. In 1976 the government attempted to tighten the supply of credit and money and at the same time put strong price control measures into effect. These measures slowed inflation to an average annual rate of 11 percent during 1976-78.

As in the case of the first oil crisis in 1974, the cost increases resulting from the second oil shock in 1979 were handled through an expansion of credit. The annual rate of inflation during 1979-81 was close to 27 percent on average, and inflationary impact of the crisis was aggravated by South Korea's promotion of heavy and chemical industries. On the supply side, real wages and labor costs soared.

The grain price support program added to the inflationary pressures. The prices of major grains in the years after 1969 were always lower than the amounts paid for grain by the government. The shortfall arising from this difference was financed mostly through long-term borrowing from the central bank, and by the end of 1984 the accumulated grain deficit by printing amounted to 2.0 trillion won (or US$3 billion), equivalent to roughly 25 percent of the money supply. Expansion of the grain deficit was one of the major reasons for credit expansion. In the meantime, price-control measures initiated in 1975

distorted the relative price structure, resulting in black marketing of a number of commodities.

While still beset by such problems, Korea was jolted by the death of President Park in October 1979. The ensuing political turmoil complicated the problems of economic management. Since inflation appeared to be the most pressing problem, a package of stabilization measures was put into effect with a view to slowing down inflation and improving the balance of payments. The package included a 20 percent devaluation, a managed float system of foreign exchange, and an upward adjustment of bank deposit and lending rates. The government also reaffirmed its determination to continue a tight credit policy. Despite these efforts, prices rose by 39 percent in 1981, and the economy had a negative rate of growth for the first time since the end of the Korean War.

The new government that took office in 1981 continued the "stabilization first" policy. This policy, combined with a drop in import prices, succeeded in decelerating inflation while maintaining 6 percent growth of the economy in both 1981 and 1982. The prices of imported commodities declined by 5.3 percent in 1982, 1.7 percent in 1983, and 2.7 percent in 1984. Prices measured by WPI rose by less than 5 percent in 1982 and by only 0.7 percent in 1984. Notwithstanding the worldwide recession, South Korea had annual growth rates of 5.6 percent in 1982, 9.5 percent in 1983, and 7.6 percent in 1984.

Foreign Exchange Control. Korea maintained a complicated system of multiple exchange rates during the 1950s and the first half of

the 1960s. As a result, the won was almost always overvalued despite periodic devaluations.

In 1961 there were two devaluations, which were intended to unify the exchange rate and to reduce currency overvaluation. This effort failed, mainly due to the government's expansionary policy, and the authorities were obliged to intensify the use of quotas and various quantitative controls over purchases of foreign exchange. A system of multiple exchange rates reappeared in early 1963 and with that, adoption of a system which permitted exporters to use their foreign exchange earnings to import commodities not otherwise legally importable (Krueger, 1979).

In May 1964, the government announced a 100 percent devaluation of the official exchange rate, from 130 to 256 won per U.S. dollar, and at the same time announced a unitary floating exchange rate system. The government was then able to maintain a relatively stable level of domestic prices, as well as a stable rate of foreign exchange, until 1967-68. As the gap between Korea's inflation rate and those of its major trading partners widened after 1968, a gradual depreciation of the won took place.

This continued until June 1971, when there was a 13 percent devaluation, from 326 to 370 won per U.S. dollar. The rate remained pegged at that level until the end of 1971, then was allowed to depreciate until June 1972, when it was again fixed at 400 won per dollar.

In December 1974, the government undertook a 21-percent devaluation from 400 won to 484 won per dollar, which lasted until the end of 1979 despite gradual overvaluation of the won and a resulting deterioration in the country's balance of payments. Delay in devaluing the currency in the latter half of the 1970s was attributable to political instability and to strong opposition from business groups with large foreign debts.

A package of stabilization measures was undertaken in 1980 aiming at slowing down inflation and improving the balance of payments. The package included a 20 percent devaluation of the won, from 484 to 580 won per dollar, and a managed floating system.

Equilibrium Exchange Rates

The equilibrium nominal exchange rates that would have prevailed under free trade -- that is, in the absence of government intervention in trade -- were estimated for each year in the 1960-84 period (see Appendix 12). To check on the results obtained, the actual real exchange rates (or the purchasing power parity real exchange rates) and the equilibrium real exchange rates were estimated, as shown in Table 5. The actual real exchange rates were calculated by adjusting the corresponding nominal rates for each year for differences in the won value of Korea's seven major trading partners' currencies as well as for differences in purchasing power; the equilibrium real rates were obtained from equilibrium nominal rates by adjusting for differences in purchasing power. In estimating the latter, Korea's CPI was adjusted to the effects of exchange rate overvaluation on the tradable part of

CPI. In estimating the two series in real terms, the year in which the external imbalance was the lowest was chosen as a base year (1977).

As can be seen, the equilibrium real rates were persistently higher than the PPP-adjusted official rates, indicating that the Korean currency was consistently overvalued. The divergence can be explained by the sizable inflow of non-trade receipts of foreign exchange to meet import requirements, along with import restrictions.

From the mid-1950s to the late 1960s the bulk of Korea's imports were financed by foreign grant aid, especially U.S. assistance. Other sources of foreign capital were relatively unimportant during this period. By the early 1970s, however, foreign grant aid had become negligible. Since then, other forms of external financing, such as long-term loans and remittances by Korean emigrants abroad have played the major role in meeting the trade gap (see Appendix 15).

An attempt was made to correlate the relative magnitude of divergence between the PPP-adjusted official exchange rates and the equilibrium real rates with net capital inflow plus transfer receipts and tariff equivalent, as shown in Figure 1. In the figure, net capital inflow and transfer receipts are presented in terms of ratio to total imports of goods and services. It can be observed from this figure that the degree of divergence is in general positively correlated with the relative size of net capital inflow and the tariff equivalent. This indicates that as the relative size of net capital inflow declines and

import restrictions are gradually lessened, PPP-adjusted real rates approach free trade equilibrium real rates.

Using regression analysis, the above-stated relationship can be quantitatively investigated. The estimated regression equation is:

$$D = \underset{(.781)}{-.0252} + \underset{(4.800)}{.326}\left(\frac{NT + CI}{Q_d}\right) + \underset{(2.319)}{.274}\, t_m + \underset{(.085)}{0.0033}\, t_s \quad \text{(t-value)}$$

$$R^2 = .938$$

where: D = Divergence ratio

Q_d = Total imports of goods and services

NT = Net transfer

CI = Net capital inflow

t_m = Tariff equivalent

t_s = Export subsidy

The results indicate that 94 percent of the variation in relative divergence between the two series is explained by the three factors, and 6 percent by unspecified factors.

Table 5. Current Account and Exchange Rates, 1960-84

Unit: Million US dollars
won per US dollar

Year	Current Account	Nominal Exchange Rates		Real Exchange Rates		
		Official (E_o)	Equilibrium (E^*)	Official[a] (e_o)	Equilibrium[b] (e^*)	Degree of Divergence between e_o and e^*
1960	10	63	176	250	371	-.329
61	50	125	258	463	654	-.292
62	-56	130	296	457	647	-.294
63	-143	130	338	378	542	-.302
64	-26	213	414	483	650	-.257
65	9	266	434	541	715	-.243
66	-103	271	452	509	700	-.273
67	-192	271	448	462	622	-.257
68	-440	277	484	429	591	-.274
69	-549	288	489	409	559	-.269
70	-623	311	507	399	537	-.256
71	-848	348	578	410	543	-.244
72	-371	393	540	459	541	-.152
73	-309	398	503	543	586	-.073
74	-1,839	400	579	526	601	-.125
75	-1,887	484	678	544	627	-.132
76	-314	484	571	488	543	-.102
77	12	484	546	484	507	-.046[c]
78	-1,085	484	556	485	500	-.030
79	-4,151	484	619	454	482	-.058
80	-5,321	607	784	504	538	-.063
81	-4,646	681	813	480	508	-.055
82	-2,650	731	835	465	488	-.048
83	-1,620	776	850	474	498	-.049
84	-1,372	806	867	476	515	-.076

Source: See Appendix 11-15.

a/ Real Official Exchange Rate $(e_o) = \dfrac{E_k / \Sigma w_i E_i}{CPI_k / \Sigma w_i WPI_i}$

where E_k = Korean exchange rate per US dollar

E_i = Index of ith trading partner's exchange rate per US dollar(1977=100)

w_i = Weight of ith trading partner

b/ Real Equilibrium Exchange Rate $(e^*) = E^*(WPI_f/CPI_k^*) = E^* \cdot \dfrac{\Sigma w_i WPI_i}{\alpha(E^*/E_o)P_T + (1-\alpha)P_{NT}}$

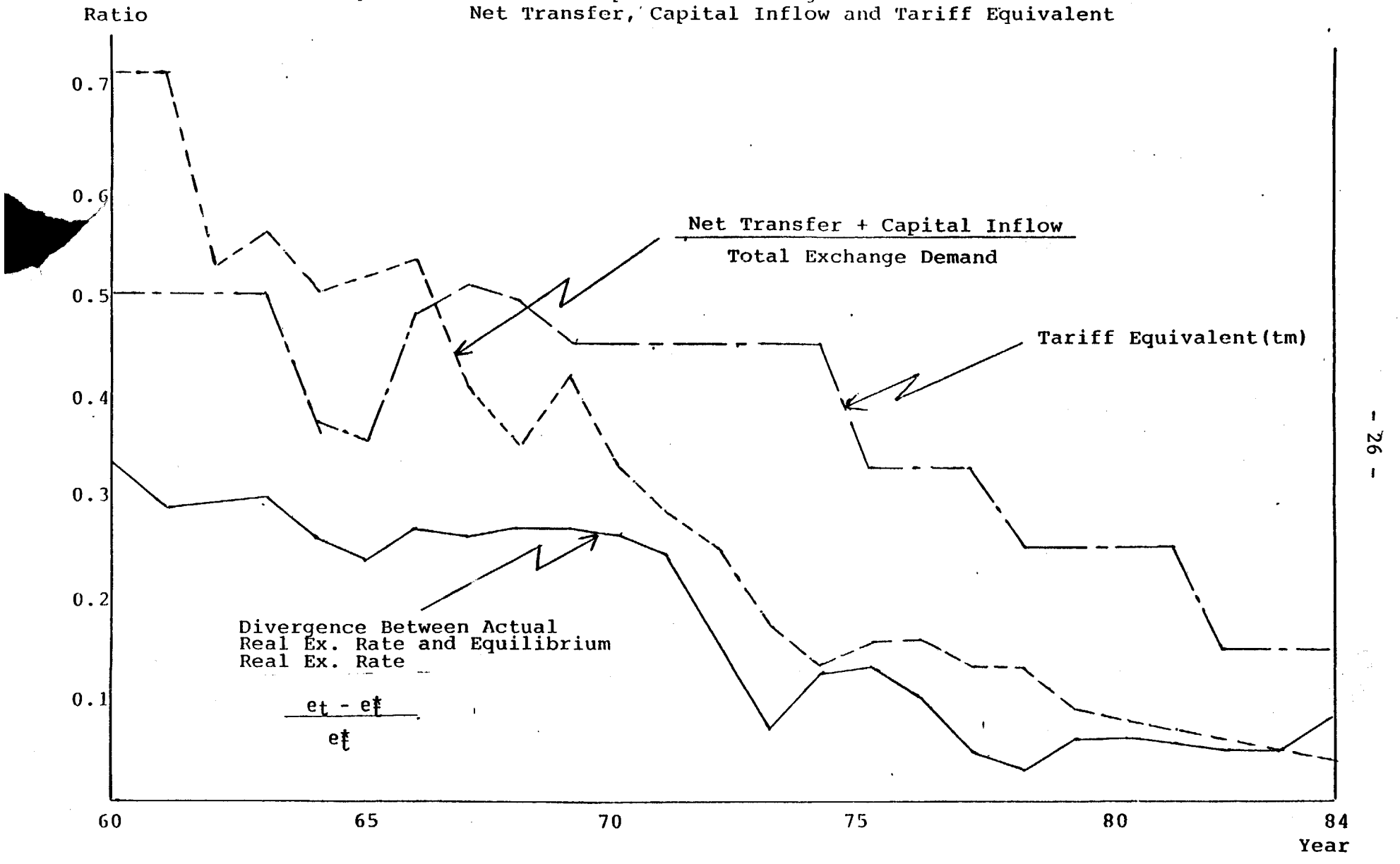
where E^* = Free trade nominal equilibrium exchange rate

WPI_f = Weighted average of Korea's major trading partners' WPI

CPI_k^* = Domestic CPI adjusted to exchange rate overvaluation

c/ Difference between e_o and e^* in the base year (1977) can be attributable to the effect of the non-trade inflow of 222 million dollars. The foreign loans and investment of 1.5 billion dollars in 1977 combined with import restrictions(expressed in terms of tariff equivalent of 33 percent) may have contributed to maintaining e_o at a level lower than e^* in 1977.

Figure 1. Relationship between Divergence Ratio and Net Transfer, Capital Inflow and Tariff Equivalent



The Agricultural Sector

Korea is a peninsula which lies in the path of typhoons originating in the Southern Pacific in summer. The summer monsoon carries warm, moist air to the peninsula from the southeast. Total rainfall is ample for agricultural purposes, ranging from less than 800 millimeters annually in the east central part of the country to over 1,400 millimeters in the southern and western coastal areas. Rain is rather poorly distributed throughout the year, however, with almost 70 percent falling between June and September. Rainfall is especially light from November to February, the "dry winter" period. Heavy rainfall during the summer months often causes damage to farm crops, while low rainfall during other months limits crop production.

Temperatures vary widely, with severe winters in the north and mild winters in the south. The frost-free period ranges from mid-April to mid-October on the northwest coast and early April to mid-November in the southwest, a difference of about 40 days. Long periods of sunshine -- about 2,400 hours a year -- are a favorable factor for growth of rice and other crops.

Land in the valleys and river plains has been shaped into paddies that are irrigated or flooded by rainwater during the warm months. The coarse alluvial soils are relatively easy to work. They tend to be suitably drained and are satisfactory for dryland crops, such as barley, soybeans, and various kinds of vegetables. Nearly all areas of podzolic soils which occur intermittently along the coast are used intensively for crop farming, especially for rice.

Rice is the major crop grown in Korea, comprising about 35.8 percent of the total value of agricultural production and 45.5 percent of the total planted acreage in 1984 (including double-cropped acreage). Other food crops, such as soybeans and other pulses, potatoes, and miscellaneous cereals grown mainly in upland areas, account for about 25.4 percent of crop area but for only 7.4 percent of total output value. While the share of cereal crops, both in total output value and planted acreage, has been rapidly declining, that of fruits, vegetables, and livestock has been steadily increasing.

Rapid economic growth and a subsequent increase in income levels have brought about considerable change in food consumption patterns. Demand for higher-quality vegetables and livestock products has increased, and consumers' tastes have shifted from carbohydrates to protein foods, such as meat and processed foods. This shift in consumption patterns, especially in urban areas, has induced Korean farmers to cultivate more high value crops as well as raise more livestock.

As already mentioned, the supply of paddyland is almost completely inelastic due to the limited availability of land as well as to the low substitutability in land use between paddy and upland. Increased production stems mainly from increases in land productivity brought about by improvement of irrigation facilities, expanded use of fertilizers and chemicals, introduction of high-yielding crop varieties, and improved cultivation practices.

Among other things, the irrigation of paddy land is of crucial importance for increasing rice yield per unit area. Although fully irrigated paddy land has been steadily increasing, poor irrigation and drainage facilities are still major constraints to larger yields and expansion of the double-cropped area.

Farm Size and Land Tenure. Korean agriculture has long been characterized by the rigidity of a smallholder structure formed under the pressure of surplus farm production. In terms of cultivable land per farm household, Korea's land endowment is probably the smallest in the world if one excludes city-states like Singapore. The government has been striving to improve the agricultural structure, but little has been achieved in terms of enlarging the scale of farming operations. The rate of decrease in the number of farm households has been much lower than that of farm population. As a result, the acreage of cropland per farm household has remained static at about one hectare for the past two decades. Nearly two-thirds of farm households have one hectare or less of cropland, but they account for only 40 percent of all cropland (see Appendix 21). It is hardly an exaggeration to say that virtually all of the problems confronting Korean agriculture originate from its fragmented structure.

It should also be noted that the proportion of medium-sized farms with 1.0-1.5 hectares (medium-size in Korea) has been increasing, while that of submarginal farms with less than 0.5 hectares and that of large farms with more than 3.0 hectares has been declining. These phenomena are attributable to the following:

First, there has been an increasing trend toward the nuclear family system in rural areas. The average size of Korean farm households decreased from 6.3 persons in 1965 to 4.6 in 1984. This is because younger family members who are better educated almost invariably migrate to cities or industrial areas.

Second, more and more farmers now hold part-time off-farm jobs to augment their incomes. Diversification of rural industrial activities and expansion of the rural infrastructure have combined to enable farmers to secure sources of off-farm income without leaving their farms. Off-farm pursuits are much more widespread among medium-sized farmers than among large farmers.

Third, the desire of farmers to hold on to their land has been strengthened by high rates of inflation and a continuous rise in land prices. Since the market price of farmland is much higher than its value as determined by land productivity, there is a stronger tendency to hold on to it. It is likely that medium-sized farmers exhibit the strongest tendency to hold on to land, since they can achieve relative financial stability by supplementing farm income with off-farm earnings. In view of the fact that both the absolute number and relative proportion of large farmers have been declining while those of medium-sized farmers have been increasing, it is almost certain that the smallholder structure will persist in Korea for a long time to come.

The Korean government established a land tenure system in 1950, whereby the land owned by landlords was distributed to all of those farming as tenants. Tenancy was virtually abolished. The farmland

reform also provided that individual holdings cannot exceed 3 hectares of cultivated land. Because of changing economic conditions, however, illegal tenancy has become widespread, especially since the early 1970s.

The farmland acreage cultivated under tenancy increased from 370,000 hectares (16.4 percent of total acreage) in 1965 to 581,000 hectares (26.8 percent) in 1983. In 1975, almost two-thirds of South Korea's farmers were classified as owners, 30.3 percent as part-owners who operated some rented land in addition to their own land, and 4.1 percent as full tenants. By 1983, however, the proportion of owners had declined to 40.2 percent, while that of part-owners had increased to 56.9 percent.

Government Policies towards Agriculture

Agricultural policy in Korea before 1945 was in line with Japan's overall colonial policy. The major objectives were to increase production of food and raw materials to satisfy Japan's own growing demand. Upon completion of cadastral land surveys in 1918-26, a series of rice production plans was formulated and implemented. Measures were taken to improve and expand irrigation facilities and to convert upland into paddy land. Improved crop varieties and chemical fertilizers were distributed. As a result, many advanced farming practices were adopted by farmers, and the level of agricultural production increased, although the compulsory measures used by Japanese authorities created much resentment on the part of Korean farmers.

The U.S. military replaced the Japanese in August 1945 and took over Japan's colonial administrative system without much modification.

Amidst the social confusion after liberation of Korea from Japanese rule, the U.S. military was obliged to concentrate its efforts on maintaining social order. The major emphasis in economic policy was reducing the postwar inflationary spiral. Government investments in and loans to agriculture were severely limited by the small size of the overall budget.

After the establishment of the Republic of Korea in 1948, some efforts were made to shift to a new agricultural policy. The most notable effort was the Land Reform Act of June 1949. The compulsory rice collection system was replaced by a government purchase system at government-determined prices in 1950. Public investment in and loans to agriculture started in 1949, when the government formulated an economic stabilization program based on counterpart funds generated by U.S. aid. This program was suspended when the Korean War broke out in June 1950. Government finance was shifted to a wartime system, with defense outlays amounting to 56 percent of total budget expenditures. The agricultural sector received only 2.5 percent. After the Armistice was signed in July 1953, policy emphasis shifted to recovering from war damage and alleviating rapid inflation.

The largest commitment of government resources to agriculture in the 1950s was for the importation of chemical fertilizer and the maintenance of existing irrigation facilities. The government's investment in agriculture was low, amounting to less than 10 percent of total government investment.

In the early 1960s the South Korean government exhibited some enthusiasm toward agriculture. Under the first five-year economic plan (1962-66), the government launched various programs to boost agricultural production, reclaim slopeland, increase the supply of fertilizers and pesticides, and strengthen agricultural research and extension. Government investment in agriculture rose to over 20 percent of total government investment outlays.

Various institutional reforms were also carried out. The major ones included a new Agricultural Cooperatives Law, enacted in 1961 to merge the Agriculture Bank into the National Agricultural Cooperatives Federation and thus to integrate cooperative marketing with the agricultural credit system. In 1962 the agricultural research and extension system was reorganized, and an Office of Rural Development (ORD) was established with the backing and financial support of the USAID.

Despite these efforts to increase food production, basic agricultural pricing policies remained the same as in the 1950s. Support for farm prices received little attention, since higher consumer prices for major food grains were believed to cause a rise in general prices.

In the 1960s the government sacrificed agricultural price supports in order to curb inflation. In the 1970s, on the other hand, grain prices were supported to improve agriculture's terms of trade and thus raise farm incomes and stimulate production, even at the cost of an increase in inflationary pressure. In the third and fourth five-year

plans, self-sufficiency in staple foods and urban-rural income parity were listed as priority targets. A massive increase in investments for land and water resources development was also envisaged, and the prices of fertilizer and pesticides were heavily subsidized. Investments in rural infrastructure were increased under the Saemaul (New Community) Movement, which was initiated in 1972.

Land and Water Resource Development

The development of water resources has been one of South Korea's goals since the first five-year plan. During the first and the second (1967-71) plan the government emphasized small-scale irrigation projects, such as the construction of small-scale dams, pumping stations, tubewell irrigation, and weirs. But in the third five-year plan (1972-76) the emphasis shifted to larger scale, integrated regional development projects.

An integrated plan for developing the four major river basins, including the construction of thirteen dams and electric power plants, was set out in 1971. In addition, afforestation and erosion control projects on watershed areas of the Han, Kum, Nakdong, and Yonsan Rivers were undertaken. Multipurpose projects for developing large farming areas were completed in the Kum River and Pyongtaek basins, where reservoirs, tidal dikes, water-pumping and draining plants, and canals were constructed. Two tidal dikes completed at Asan and Namyang bays in 1974 were the largest water resource development projects in Korean history.

Completion of these projects brought 11,000 ha of land

reclaimed from the seabed under cultivation and also irrigated 16,000 ha of existing farmland. Paddy field consolidation projects, initiated in the mid-1960s, were promoted with a view to facilitating farm mechanization and increasing farming efficiency. Paddy fields rearranged under this program amounted to 500,000 ha by 1984, or approximately 33 percent of Korea's total paddy lands. Investment in land and water resource development projects accounted for 40-45 percent of all agricultural investment during the 1970s but increased to over 50 percent since 1980.

Increased Supply of Fertilizer

Given limited land resources, an increase in land productivity is the best and probably only means of increasing aggregate agricultural production. A high rate of fertilizer application is part of the answer. Since the early 1960s the government has made all-out efforts to increase fertilizer use by providing price subsidies and purchase credits. As a result, fertilizer consumption more than doubled during the 1965-84 period, from 393,000 metric tons in 1965 to 792,000 metric tons in 1984.

This rapid increase in fertilizer consumption led to the construction of a series of large-scale fertilizer plants. By the mid-1970s the country had not only achieved self-sufficiency in fertilizer supply but was producing export surpluses. In the early 1980s, average annual production reached 1.4 million metric tons, exceeding the annual domestic requirement by over 600,000 metric tons. Between 1976 and 1984, 37 percent of South Korea's fertilizer production was exported.

Since the enactment of the Fertilizer Control Law in 1962, all fertilizer marketing has come under government control, including determination of overall requirements, procurement, and pricing. At the end of each year the government informs each fertilizer manufacturer of its procurement plan, including price and quantity, and concludes a contract. At the same time the government announces selling prices to farmers. Fertilizer is then acquired by the National Agricultural Cooperatives Federation (NACF) and sold to farmers through NACF local branches. The government purchases fertilizer at prices higher than those at which it sells to farmers and exports at a still lower price.

The implementation of a two-price system designed to protect consumers, farmers, and fertilizer manufacturers simultaneously has inevitably resulted in increasing the government deficit. The total accumulated deficit in the fertilizer account reached approximately 712 billion won in 1984, or about one-third of the deficit incurred for grain subsidies.

If the fertilizer deficit were to be eliminated by raising the selling price to farmers while the prices paid to manufacturers remained unchanged, fertilizer prices would have to be raised on average by 72 percent. If the deficit were to be eliminated by reducing the procurement prices the necessary reduction would be 32 percent of what is currently being paid. This suggests that farmers have paid more than half the direct cost of protecting fertilizer manufacturers in recent years. During the five years prior to 1976, by contrast, domestic fertilizer prices were close to or below export prices.

Until the mid-1970s, Korean farmers purchased fertilizers at prices lower than world market prices. Since then, however, the government purchase price has averaged 60 percent above the export price, while the sales price (net of marketing costs) has averaged 22 percent above the export price. The sales price of nitrogen fertilizer, for example, is almost double that of the export price, while the prices of phosphate and potash fertilizers are about 20 percent higher. Such high pricing for domestically produced fertilizer, despite surplus production, is mainly attributable to the unfavorable terms agreed to at the time that Korean companies entered joint ventures with foreign enterprises to construct fertilizer plants. The Korean government, for example, is obliged under one joint agreement to buy the entire output at prices that guarantee a profit of 15 to 20 percent.

If the price currently paid to Hankuk Fertilizer Company, one of the leading fertilizer manufacturers, were to be used as the criterion, 47 percent of the total deficit attributable to fertilizer could be traced to the subsidy for manufacturers and the remaining 53 percent to the subsidy for farmers. But if export prices were to be used as the benchmark, most of the deficit would be the result of the subsidy paid to the fertilizer industry.

According to a recent estimate (Lee, 1986), the protection rate for the Korean fertilizer industry was 68 percent for the 1976-84 period, while that for Korean farmers who purchased fertilizer was (-)18 percent. For urea alone, the protection rate for fertilizer manufacturers was estimated as 61 percent while that for Korean

purchasers was (-)51 percent. These results indicate that the fertilizer industry has benefited to a considerable degree from the government price subsidy program. Korean farmers, on the contrary, have paid high fertilizer consumption taxes.

Agricultural Credit Expansion

The National Agricultural Cooperatives Federation (NACF) is given sole responsibility for the administration of agricultural loans financed by government funds. No other organization is authorized to borrow from the government or the central bank for agricultural loan purposes. Since the government supplies a major portion of the capital loaned by NACF, nearly all of the organization's programs must adhere to guidelines issued by the government. For instance, NACF's annual business program requires prior approval from the Ministry of Agriculture and Fisheries (MAF) and the Ministry of Finance (MOF). Within overall guidelines for domestic credit, MAF and MOF determine the level of resources available for NACF. They then allocate credit to specific sectors and activities in accordance with government priorities at government-set interest rates.

The sources of financing consist of government funds, borrowings from the Bank of Korea, agricultural bond issues, deposits received, and foreign loan funds. Although financial support from the government for agricultural development steadily expanded in absolute terms during the postwar period, it was insufficient to meet the rapidly rising demands for medium- and long-term farm loans. Since the government funding alone could not meet the increasing demand for

investment loans, NACF had to draw on the deposit source to finance medium- and long-term loans. Since the early 1970s, agricultural cooperatives have made all-out efforts to raise funds on their own. A campaign to attract a trillion won in rural savings was set in motion in 1974.

As of 1970, the cooperatives' own funds constituted only 30 percent of their total loan funds, but this share increased to about 70 percent by 1980. Since the interest rates on NACF loans are only 8-15 percent, compared to 30 percent on loans from private sources, demand for credit from NACF has continued to exceed supply. Among the various problems created by this excess demand has been a tendency for loans to be made to richer farmers, who are better risks and have more local political clout. A law designed to channel more funds to poorer farmers was passed in 1971, but it has not yet altered this bias.

Agricultural Research and Extension

Since the Office of Rural Development (ORD) was established in 1962, it has evolved into a remarkably effective agricultural research and extension organization. Agriculture research and extension services have been continuously expanded to improve farming technology through such methods as the introduction and diffusion of improved varieties of rice, barley, and soybeans. Efforts have also been directed toward promoting more efficient application of fertilizer and pesticides. The high level of fertilizer use in Korea today is largely attributable to extension activities as well as the government policy of making sufficient supplies available to farmers at subsidized prices.

One of the most noteworthy achievements in the field of agricultural research was the development, in cooperation with the International Rice Research Institute, of the high-yielding fertilizer-responsive rice variety, IR 667 (or Tongil), which yielded on the average 25-30 percent more than traditional varieties when grown on well-irrigated paddy and accompanied by improved cultural practices. Despite poor cold resistance and unsatisfactory milling qualities, the acreage planted to this variety increased from 200,000 hectares in 1972 to almost 1,000,000 hectares (or 85 percent of the total paddy area) in 1978. This rapid diffusion was convincing evidence of the effectiveness of rural extension services. The market price of the new rice soon began to fall, however, because of consumers' preference for conventional rice, and by 1984, the acreage devoted to Tongil had declined to less than 300,000 hectares. In retrospect, it seems that the government's desire to achieve self-sufficiency in rice production, combined with authoritarian rural extension agents, led to excessively rapid diffusion of the new variety regardless of producers' and consumers' preference.

Despite problems like this, however, it is clear that the Office of Rural Development has acquired the capacity to improve crop and animal production and to make knowledge about the use of technology available to Korean farmers (Ruttan and Krueger, 1986).

Promotion of Farm Mechanization

Stimulated by rapid changes in rural conditions -- especially the steady outflow of the rural work force and rising rural wages -- the

government over the years has initiated various measures designed to facilitate the introduction of labor-saving farm implements. As a result, farm machinery has increased sharply in both number and variety in recent years.

About 600,000 power tillers were on hand in rural areas at the end of 1985, representing 1 tiller for every 3 households. The number of power sprayers and dusters in use increased to 514,000, or 1 unit for every 4 households. The government began to provide loans for the purchase of high-performance implements, such as tractors, transplanters, harvesters, and combines in 1979. By 1985, approximately 42,000 transplanters and 26,000 harvesters were in use, or 1 unit for every 50 and 75 households, respectively.

The number of machines in use is expected to increase rapidly in the years to come.

The degree of farm mechanization attained thus far, however, has not yet resolved the rural labor shortage. This is because utilization and diffusion of farm machinery have been impeded by the prevailing small-scale, fragmented farming operations and by inadequate physical and economic conditions for mechanization.

In conjunction with the introduction of rice transplanters, harvesters, tractors, and combines, the government established 1,600 farm mechanization demonstration districts in 1977. These are designed to demonstrate integrated systems of mechanization and joint utilization with a view to enhancing farmers' knowledge and improving the rates of utilization of available machinery.

These demonstration centers are operated by agricultural cooperatives or farmland improvement associations. They mostly do rent-work for farmers in their areas in return for fees. Although they have been somewhat successful in disseminating the skills needed for integrated mechanized farming, they have encountered various problems in operation and management, including financial losses.

Improvement of Rural Living Environment

Under the Saemaul (New Community) Movement, massive investment projects were undertaken to improve the rural living environment. They included sanitary water supply systems, improved sewage systems, housing improvements, village reconstruction, the expansion of electrical and communication networks, etc.

Sanitary water supply and improved sewage systems have made a substantial contribution to reducing the frequency of waterborne diseases. Prior to the Saemaul movement, most farm households depended for both drinking water and water for other purposes on unsanitary village wells, located at a distance from most residences. The installation of running-water systems has not only provided disease-free water but also been a great convenience to households. By 1984, a total of 31,330 South Korean villages had benefited from this effort.

Housing improvement projects have also contributed substantially to modernization of the rural environment. In the past the grey straw-thatched roofs of farm houses were considered a symbol of rural poverty and economic stagnation. A straw roof had to be replaced every year and required considerable labor. Replacement of the straw

with clay tiles or other permanent materials has made it possible for farm families to use the straw for other purposes, such as straw bags and compost. By 1984, a total of 15,000 farmhouses had received improved roofs.

Village restructuring projects, consisting of the relocation, redevelopment, and partial improvement of villages, have raised villagers' confidence in further improvements in their living conditions. By 1984, 3,500 villages had completed restructuring projects with government financial assistance.

Another important achievement has been the expansion of electrical and communication networks. Only about 20 percent of the more than 2 million farm households in 1971 had electric lighting, while the remaining farmers relied on kerosene lamps. By 1982, however, rural electrification and the installation of a telephone system were completed except in remote mountainous areas and on isolated, small islands. The socioeconomic impact of these projects is quite impressive. The projects have helped to reduce the cultural gap between the rural and urban sectors. Electrification has created new consumer demand for home appliances, such as television sets, refrigerators, electric cookers, and electric irons. It has also led to the use of electric power for productive purposes, such as repair of farm machinery. The expansion of communication networks, especially the widespread installation of public telephones, has not only reduced the social distance between villages and cities but also increased the efficiency of transmitting public information, including news about farm

products and market conditions. The construction of village roads, farm feeder roads, and small bridges has facilitated farm mechanization, the marketing of farm products, and the mobility of farm inputs.

During 1975-84, government investment designed to improve the rural living environment increased from 18 billion won to 247 billion won, or approximately 22 percent of total agricultural investment.

Improvement of Agricultural Marketing

Although Korea has experienced remarkable growth in its agricultural sector, agricultural marketing has been relatively neglected by the government. It was not until 1980 that the government initiated a comprehensive plan for improving agricultural marketing. The rapid rural-urban shift, accompanied by rapid growth in consumer income, has brought about substantial changes in the food supply and demand pattern and made it almost imperative to improve the marketing network to enable it to handle the increasing volume and variety of marketed agricultural products.

The government promulgated a law in 1980 to improve the marketing structure while protecting producers and consumers and contributing to price stabilization. The law specifies that the government shall formulate a master plan for marketing modernization. The Ministry of Agriculture and Fisheries formulated a comprehensive five-year plan (1982-86) for developing agricultural marketing. The plan included the conversion of wholesale markets into public institutions, the construction of new municipal markets, and the establishment of procedures for orderly trade. The Ministry of

Agriculture and Fisheries decided on public ownership of wholesale markets to reduce market disorder and to strengthen the role of local governments. The plan also encourages vertical integration of collection and delivery centers (Sung, 1985).

Chapter 2

HISTORY OF AGRICULTURAL PRICING POLICIES

Policy decisions pertaining to food grain prices, particularly rice prices, have long been the central issue in agricultural price policy, and the term "food grain price policy" has been virtually synonymous with "agricultural price policy" in Korea. It was not until the mid-1970s that a few non-cereal products were included in government support programs.

Prior to 1939, Korea was a rice-exporting country, and Japan was its principal export market. There was no government intervention in grain marketing. It was only after the Sino-Japanese war broke out in 1939 that interventions in grain marketing began, primarily to meet military demand. An administrative order was issued requiring farmers to sell a portion of their rice to the government at government-determined prices.

Japan's subsequent involvement in World War II led to a further increase in military demand. Compulsory grain delivery quotas were assigned to farmers, and supplies to consumers were rationed. The government-determined prices were so low, however, that the main concern of farmers was to minimize actual delivery of grain. This system continued until the end of World War II.

After the liberation of Korea in August 1945, rationing was discontinued and free-market transactions were resumed. The U.S. military authorities apparently believed that Korea had a substantial

surplus of food grains, given the records of rice exports. The result of liberalization, however, was an aggravation of the imbalance between supply and demand. The repatriation of approximately 1.2 million Koreans from abroad and an influx of about 2 million refugees from North Korea caused a sharp rise in both consumption and grain prices. The wholesale price of polished rice rose from 1.0 won per 80 kilo bag in October 1945 to 6.0 won per bag in June 1946. The wholesale price index rose almost twofold during the same period.

Fearing the confusion attendant on a switch from a wartime to a peacetime system, the U.S. military government reconsidered the free-market system. With a view to stabilizing prices and protecting urban consumers, the U.S. authorities put into effect a ceiling-price system at the retail level for 11 major consumer items, including rice, barley, and cotton cloth. But the ceiling prices were never honored in the market. Hoarding and black marketing operations prevailed. Consumers who had been dependent upon government rations suddenly found rationing eliminated and no alternative source of supplies. Grain prices almost doubled within a few months.

In January 1946 the authorities issued a rice collection decree which permitted direct government intervention in the grain market. The military authorities believed that direct government control of the rice stock would be more effective in alleviating inflationary pressure than price control schemes. The free grain market was closed, and compulsory rice collections from farmers and a rationing system for urban consumers were enforced. This system continued until 1948. Although it helped to

balance the overall supply and demand for rice and contributed to some extent to alleviating inflation, the system also reminded the public of Japanese rule. Furthermore, due to a lack of administrative ability and a dearth of adequate statistics on grain production, it was difficult to allocate government procurement quotas fairly among different localities and individual farmers.

The Republic of Korea came into existence in August, 1948. In November 1948 the government instituted a grain purchase law. The major provisions of the new law were virtually the same as those of the old decree. Grain producers and landowners were required to sell to the government all grain other than that required for home consumption and seed use. Free market transactions of grain were prohibited. The stated objectives were to improve farm income through government purchase at an adequate price level while securing a stable supply of food grain for urban consumers. However, the government could not obtain enough grain to implement rationing. The main reason was low purchase prices, much lower than the market price. The low purchase prices in turn were attributable to the limited government funds available for grain procurement and underestimation of grain production costs.

A fundamental change in policy was inevitable. Overall control was lifted, free market transactions were allowed, and the rationing system was changed to a priority system. First claim to the limited grain supply was given to the military, the police, government employees, and workers in critical industries, such as coal mining and

railroads. Urban consumers not receiving rations were able to purchase from the open market.

While enforcing this partial rationing system, the government enacted a grain management law in February 1950. The primary objective was to enable the government to secure sufficient grain from farmers so as to stabilize the economy. The main provisions of the law were reaffirmed in 1963, 1967, and 1970.

Following the outbreak of the Korean War in June 1950, the securing of grain for the military and the distribution of grain to war refugees emerged as priority issues. Because of crop failures in 1951 and 1952, however, the government was unable to secure the required amount of grain through direct purchases. Moreover, due to budgetary requirements, inflation, and spiraling grain prices, the government was compelled to discontinue direct purchases. Instead, an attempt was made to secure grain by reimbursing owners for land distributed to tenant farmers at the time of land reform in 1950. At the same time, a measure to collect a land tax in kind and a scheme to barter fertilizer for rice were initiated. Land tax collection was rather successful, but the government had much less success in collecting rice through the barter program. The implicit price of grain being bartered was lower than that prevailing in the market.

The availability of American grain under U.S. Public Law 480, beginning in 1945, enabled the Korean government to keep grain prices low. Imported under this program were wheat, barley, raw cotton, corn, milo, and tallow, with wheat and barley accounting for about 50 to 60

percent of the total value of imports. The quantity of grain imported under this program was, on average, equivalent to 8 to 12 percent of annual domestic grain production during the 1956-65 period.

As the economy entered the 1960s, and gradually recovered from the war, there was a strong tendency among policymakers to identify economic growth with industrialization. In both the first and second five-year economic development plans, the major objective was rapid industrial growth. This industry-oriented strategy necessarily required massive investment in the nonagricultural sector. The goverment's efforts were directed toward maintaining low prices for staple food grain and preventing wide seasonal price fluctuations, rather than toward maintaining adequate prices to support farm incomes. Government purchase prices were below market prices almost every year. Low food prices for urban workers were not only rationalized in terms of equitable income distribution but also served to increase industrial profits and capital formation at the expense of farm producers.

Adverse terms of trade for farm producers due to this policy further impoverished the already poor rural economy. It hindered efforts to increase food production while at the same time it stimulated rice consumption, resulting in a widening food gap. As long as a large portion of the shortage could be covered by local currency purchases under the PL 480 program, the food gap did not impose a serious burden on the country's foreign exchange position. But when the U.S. policy shifted in the late 1960s to cash or credit sales in U.S. dollars, the food grain situation became directly related to the balance of payments

position. In 1962, for instance, the total value of imported food grain amounted to $70 million, of which $34 million (or approximately 50 percent) was used for PL 480 purchases. By 1975, grain worth $700 million was imported on cash or credit terms. In the early 1980s the country had to spend more than $1 billion annually for grain imports.

Faced with a rising food shortage, the resultant foreign exchange constraints, and a growing disparity in income between urban and rural households in the 1960s, Korean policymakers were obliged to give serious consideration to expanding food grain production. In particular, the world food crisis and soaring grain prices in the early 1970s made it almost inevitable for the government to shift the emphasis of its development strategy toward agriculture.

The government undertook to improve the terms of trade in favor of farm producers by raising the real purchase prices for rice and barley, and after 1969 the prices of agricultural products rose more rapidly than the prices paid by farmers for nonfarm products.

Higher purchase prices for grains clearly reflected a dramatic change in farm price policy. Under conventional grain practices, because of the intermediate handling costs incurred by the government, a higher purchase price would have automatically led to a higher selling price to consumers. A higher selling price, however, may exert upward pressure upon the general price level as well as upon urban living costs. The only way to protect the interests of farm producers and urban consumers simultaneously was to establish a two-price system for

major food grains -- higher prices for commodities sold by farmers and lower prices for goods sold to urban consumers.

The implementation of the two-price system, however, conflicted with other objectives, such as financial and monetary stability. As the difference between the purchase and selling prices of rice and barley widened, the financial losses of the grain management fund increased. Since a large portion of this deficit was financed by inflationary or by long-term overdrafts from the Bank of Korea, this policy became a major factor in an increase in the money supply. Expansion of the government deficit due to the two-price policy finally emerged as a serious constraint to the policy.

In the mid-1970s the government began to take measures to reduce the deficit. The burden of reducing this deficit fell on farm producers. Annual increases in the purchase prices of rice began to fall behind the rate of inflation. There were two reasons for this shift. First, policymakers became increasingly concerned about upward pressure on the general price level caused by increases in the money supply resulting from inflationary financing of the grain deficit. Second, the financial requirements for developing heavy industry and expanding social overhead capital were enormous, and the costs of the two-price policy almost exceeded the tolerable limit.

Relative Importance of Objectives

Of the many conceivable objectives sought by the government, the following six are directly relevant to the formulation of agricultural pricing policy:

1. Enhancing farm income;
2. Food self-sufficiency;
3. Reducing foreign exchange expenditures on food imports;
4. General price stability;
5. Urban consumer welfare;
6. Reducing government costs.

The relationships among the objectives are clear. The first three objectives complement one another, but they compete with the last three objectives. That is, a higher grain price will provide farm producers with incentives to expand production, while at the same time improving farm income. Expanded production and reduced consumption due to higher prices may reduce imports of foreign grain. On the other hand, a higher grain price may have a negative effect upon the general price level, government costs, and urban living expenditures.

However, depending on how the government operates the food grain program, competitive objectives as defined above may not always be in conflict. For instance, a two-price system for grain may achieve the conflicting objectives of higher farm income and lower consumer prices. But such a system conflicts with the objective of reducing government costs.

The South Korean government has historically placed higher priority on general price stability which favors the urban, industrial sector, with a support-period exception during the 1969-75 period.

Table 6 presents the authors' judgement of the relative importance of policy objectives, with numerical weights assigned to each category of objectives.

Table 6. Relative Importance of Objectives

	1950-68	1969-75	1976-84
Farm Income Food Self-Sufficiency	0.3	0.5	0.2
Foreign Exchange	-	0.2	0.2
Price Stability Urban Consumer Welfare	0.5	0.3	0.3
Government Costs	0.2	-	0.3

Government Institutions and Parastatals

The Korean government's efforts to achieve such objectives as food security and equitable income for the rural population is reflected in pervasive intervention in the agricultural sector by public and semi-public institutions.

The Ministry of Agriculture and Fisheries (MAF) has primary responsibility for formulating agricultural policies and development programs in rural areas. Other ministries, such as the Ministry of Home Affairs, the Ministry of Social Affairs, the Economic Planning Board, and the Ministry of Construction are also concerned with improving the

rural infrastructure, rural employment, rural industrialization, and living conditions. Various bureaus within the MAF have authority for foodgrain and other price support programs, land and water resource development, fertilizer distribution, credit programs, marketing programs, and imports and exports of agricultural products.

Three other organizations directly concerned with agricultural price policy and product marketing include the National Agricultural Cooperatives Federation (NACF), the National Livestock Cooperatives Federation (NLCF), and the Agricultural and Fisheries Development Corporation (AFDC).

NACF is a nationwide organization consisting of 1,476 local primary cooperatives for producers of major grains and 42 special-purpose cooperatives for marketing mostly horticultural products. NACF handles grain price support and distribution programs, and has a monopoly on fertilizer distribution. It provides farm credit, markets farm products, and sells various agricultural inputs.

In principle, NACF is supposed to be a voluntary organization. But in reality, it acts more as a monopolistic arm of the government. As a consequence, Korean farmers do not regard NACF or its local cooperatives as their own organization. Farmers exercise little control over NACF and have only a small investment in its capital structure. Economic and political conditions at the time NACF was formed in 1961 made it necessary for the newly-formed organization to depend heavily on the government for financial support.

NLCF was established in 1980, being consolidated with the Livestock Industry Development Corporation created in 1978. This organization provides livestock development loans to its members and imports and exports livestock products under an MAF-determined supply and demand program. NLCF also controls the Livestock Development fund which finances technological and infrastructural support for livestock development and offers credit to farmers for purchases of dairy and beef cattle.

In 1983, NLCF and its member cooperatives entered the banking business in rural areas. Since membership in livestock cooperatives is open only to farmers with five beef cattle or more, ineligible cattle farmers lost access to credit from formal sources. The separation of rural credit functions between the NACF and NLCF evidently discriminates against farmers who raise only one or two cattle or a few swine.

AFDC was created in 1968. Its main function is to make loans for the development of facilities for processing, storage, and marketing of agricultural, forestry, and fisheries products. It obtains its funds from government and foreign sources, including the World Bank. Because of financial limitations, AFDC tends to favor relatively well-established agro-firms in urban areas.

AFDC also controls the Agricultural Products Price Stabilization Fund and carries out buffer stock operations for such agricultural items as peanuts, red peppers, sesame seeds, soybeans, garlic, and onions. Yearly determined amounts are procured at off-season, when prices are high. AFDC was given sole authority to import

and export the quantities necessary to perform its buffer operations. In most cases, it loses in handling domestic products but profits from imports.

Major Instruments of Price Intervention

The major policy instruments used by the government for price intervention are: (1) government purchase of staple food grains and price determination; (2) government monopoly of fertilizer distribution, and price determination; (3) control of agricultural credit; (4) buffer stock operations for non-cereal farm products; (5) a system of price ceilings for beef and pork; and (6) quantitative restrictions and tariffs on agricultural imports. Some of these topics are discussed below, while some are discussed elsewhere in this report.

Purchase of Grain and Price Determination. Foodgrain administration is the responsibility of the Food Bureau in the Ministry of Agriculture and Fisheries. The Food Bureau is responsible for formulating and implementing food policies and programs at the national level. Food divisions in provincial and city administrations receive instructions from and report to the Food Bureau.

Financial transactions involving the Food Bureau are handled by the NACF as the Food Bureau's agent. Through its city and county branches and primary unit coops, the NACF disburses funds to pay for grain purchased from farmers.

The government acquires grain from farmers at prices set by the government during or after the harvest season. The major acquisition programs include: (1) direct purchase, (2) rice-fertilizer barter, and

(3) collection of harvest taxes in kind. In recent times, almost all grains have been acquired through direct purchases. The principal supply programs are: (1) military use, (2) government institutions, (3) prisoners and detainees, (4) relief, (5) seed grain distribution, (6) grain loans, (7) price stabilization, and (8) contingency or emergency programs.

In the earlier period a major function of the government grain operation was to supply the armed forces and government institutions. The emphasis now has been shifted to supporting producer prices at levels sufficient to give farmers strong production incentives and to assure consumers of low prices. Implementation of the price support policy has been through the operation of the government's Grain Management Fund (GMF).

Buffer Stocks. The buffer stock program is intended primarily to prevent excessive price fluctuations. The government set in motion in 1970 a program to purchase selected agricultural commodities at government-set prices during their harvest seasons and to sell during the off-season, when prices begin to rise. Selling prices are determined on the basis of the purchase price plus handling and storing costs, with the prevailing market prices also taken into consideration. The list of products stockpiled under the program encompassed red pepper, garlic and sesame in 1971. Peanuts, eggs, soybeans, onions, and laver (processed sea weed) were added to the list later.

In light of the fact that the stockpiling program requires a lump-sum release of government funds (through the Agricultural and

Fisheries Development Corporation) to purchase crops in a short period of time, the government initiated a marketing-regulation program in 1972 to complement the stockpiling program. Under this program, the AFDC makes advance payments to producers--instead of buying crops directly from them--to enable them to hold their products off the market during the harvest season, when prices tend to be depressed. A study (Moon, 1982) indicates that this program made a substantial contribution to alleviating fluctuations in prices, resulting in benefits for both producers and consumers.

QRs and Tariffs. Prior to 1956, all imports had to be approved by the government. But a semi-annual trade program was instituted in 1957, when some automatically-approved items began to be included in the trade list. Although substantial liberalization of imports of manufactured items has been undertaken by the government in recent years, most of the important agricultural products are still on the restricted list, reflecting a highly protective agricultural policy. Out of 492 CCCN eight-digit agricultural commodities, 149 items were still subject to quantitative restrictions as of 1985. They included rice, feed corn, corn for industrial use, soybeans, milo, compound feeds, beef, pork, etc. Imports of these items are allowed only when importers obtain licensing from the relevant ministries, mainly the Ministry of Agriculture and Fisheries. Licenses are issued only when domestic producers cannot meet demand.

A uniform tariff of 10 percent was levied on all imports until 1950. In 1950, however, the government introduced a multi-tariff

system, with rates differing with commodities. For agricultural commodities, the tariff rates range from 5 to 30 percent of imported value--5 percent for rice and wheat, 7 percent for feed corn, 10 percent for soybeans, 22 percent for meatstuffs, and 30 percent for corn for industrial use. In actuality, however, a significant proportion of imports of major grains are exempted from tariffs to achieve price stabilization in the domestic market.

Historically, tariffs on agricultural imports have not been used by the Republic of Korea to raise government revenue nor to maintain domestic producer prices by insulating domestic from world prices. Therefore, inasmuch as agricultural commodities are concerned, tariffs have not been an effective deterrent to imports. It is quantitative restrictions that are used to ensure that domestic prices are not reduced by competition from cheaper imports.

Phases of Intervention

The evolution of price intervention by government can be divided into five different phases, depending on the extent to which price interventions were used, their complexity, and the direction in which they were changing.

Phase I is characterized by government intervention in the prices of a limited number of important products or inputs. The rates of subsidization or taxation are relatively low. Phase II is characterized by increasingly complex intervention both in the number of subsidized or taxed products and in the instruments used. Phase III is defined as a period of transition in which the government attempts to

reform the system of agricultural price intervention. This reform may be part of a more general effort to rectify distortions in other policies, such as international trade, the exchange rate, monetary policies, etc. This reform effort may result in the elimination of price controls for some products to bring their relative prices into line with their equivalent border prices.

If Phase III is successful, it is normally followed by Phase IV. The main feature of Phase IV is a reduction in intervention. Phase V is characterized by a virtual absence of direct price intervention. In Phase V, the relative internal prices of agricultural products at the producer and consumer levels are approximately equal to their equivalent relative border prices.

Korea's agricultural pricing policies during 1950-69 can be characterized as belonging to Phase I. Government price intervention was limited to staple foods, notably rice and barley, and fertilizer. The degree of market control varied from year to year. The Grain Management Law, enacted in 1950, gave the government the authority to regulate the prices of staple foods. The market share of government-controlled rice was less than 10 percent during the 1950s but expanded to 20-25 percent during the 1960s. Throughout this period, the government placed emphasis on maintaining low domestic prices for staple foods.

In the early 1970s there was a move toward Phase II, with government price intervention becoming more intense. The buffer-stock operation for non-cereal products was set in motion, and pesticides and

farm machinery were added to the list of subsidized inputs. The government's purchase prices for rice and barley had been steadily raised with a view to increasing food production as well as reducing the urban-rural income gap. As a consequence, the average effective rate of protection for rice rose from (-)26 percent in 1962-69 to 39 percent in 1970-79. Although the government raised the producer prices for staple food grains, it did so without a comparable rise in the market prices of rice and barley. The result was a substantial deficit in the grain account that had to be made up by the central bank.

Entering the 1980s, the Korean government took a great leap forward by reducing both tariff and non-tariff protection for manufacturing industries. It announced a plan to raise the import liberalization ratio to 95.2 percent by 1988. In other words, Korea began to move from Phase IV to Phase V with respect to industry. In contrast, the level of protection for agriculture has steadily increased. The producer prices of farm products continue to be maintained far above border prices, and most agricultural commodities are still on the list of import restrictions. The effective rate of protection for rice has risen to 74 percent, and that for beef to as high as 112 percent.

At present, one observes no signs of an effort to reduce government intervention in agricultural pricing policies and to move to Phase III. Hence, so far as agricultural pricing policy is concerned, Korea still remains in Phase II. Table 7 indicates the related policy decisions which characterize each of the two phases.

Table 7. Phases of Intervention

Years	Phase	Main Feature of Phase
1950-69	I	Enactment of the Land Reform Law, 1949 Tenant-farmed land distributed to tenants and landlords paid in government bonds with the face value stated in terms of rice.
		Enactment of the Grain Management Law, 1950 Government given full authority to control food market, including purchase and selling prices, imports and exports of grain, etc.
		Signing of the U.S. Farm Surplus Importation Agreement (PL 480), 1955 Importation of above 10% of total grain requirement made it easier to control grain market and to pursue low-price policies for staple food grains through supply management.
		Market share of government controlled rice rose from 10% in 1950-59 to 20-25% in 1960-69.
		Newly established NACF given sole authority to distribute chemical fertilizer, 1962.
		Domestic currency(won) substantially overvalued under the fixed exchange rate system
		Annual average inflation rates 17.5% for 1955-59, 13.0% for 1960-69
		Exchange rate devalued by 100%, from 130 to 256 won per US$, 1964
		Effective rate of protection for rice rose from (-)28.8% in 1962 to (-)22.4% in 1969, and that for beef from (-)23.9% to (-)2.6%
		Two-price policy initiated for rice and barley, 1969

Table 7 cont.

1970-85	II	Buffer-stock operation initiated for non-cereal farm products including red pepper, sesame, peanuts, garlic, etc., 1972. The number of products steadily increased. World food crisis spurred government to use price incentives for increased food production, and government purchase prices for rice and barley steadily raised, resulting in large amount of government deficit. Government deficit compensated for by inflationary financing. Rice saving measures enforced, e.g. no rice serving for two days a week, etc. 1973. Saemaul Movement initiated, 1972 Market share of government controlled rice rose to 35-40% by the early 1980s. Rice self-sufficiency nearly attained by the early 1980s. Ceiling price system for beef and pork implemented, 1979. Annual average inflation rates 15.6% for 1970-79 and 13.0% for 1980-84. Exchange rates devalued by 13% in 1971, 21% in 1974 and 20% in 1980, and exchange control reduced by adopting floating system, 1980. Import liberalization ratio of manufactured goods increased to 90% by 1985. Agricultural protection rates steadily rose; effective rate of protection for rice rose from (-)16.9% in 1970 to 52.0% in 1984, and that for beef from 0.0% to 151.5%.

Chapter 3

MEASURES OF INTERVENTION

We begin by analyzing the effects of direct government intervention, such as direct price control or price support, in the prices of major agricultural products. In analyzing these effects, our basic premise is that government intervention in the pricing mechanism causes a distortion in the relative prices which would otherwise prevail in the competitive market, regardless of its legitimacy in terms of greater economic efficiency or more equitable income distribution.

Effect of Direct Intervention on Relative Prices

The approach used here is to start with existing relative prices (which reflect the effects of all price interventions) and then to subtract the various price interventions to determine relative prices without intervention (The World Bank, 1985). In order to do this, it is necessary to have a reference price. A commonly accepted reference price is the international price of a commodity at the country's border, i.e., the border price. This notion is based on the assumption that the prices of traded or tradable goods tend to equal the price of the same commodity on international markets. Despite the fact that there are a number of problems and limitations in using the borderprice as a reference price, it appears to capture the real opportunities open to countries through trade and hence provide a useful reference point. Usual practice is that the c.i.f. import price is used in the case of

importable goods as the border price and the f.o.b. export price is used in the case of exportable goods as the border price, where it is converted into domestic currency at the official exchange rate.2/

In measuring the net effect of direct intervention on relative prices, the prevailing relative prices at the producer level are calculated first. Next, the relative prices that would have prevailed in the absence of direct intervention (relative border prices) are calculated. Finally, the percentage differences between the prevailing

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2/ In measuring the nominal protection rate (NPR_D) for Korea for 1955-63, Anderson and Hayami (1986, p. 22, p. 124) used the purchasing-power-parity effective exchange rate on imports obtained from "Foreign Trade Regimes and Economic Development: South Korea, pp. 70-73" (Frank, Kim and Westphal, 1975) to convert the domestic prices of nine agricultural products to border price equivalents. Frank, Kim and Westphal estimated the purchasing-power-parity exchange rate after adding the actual tariff and foreign exchange tax per dollar of imports to the official exchange rate. Since the actual tariff belongs to direct measure and foreign exchange tax to indirect measure in our concept, it is doubtful that Anderson and Hayami's calculation could be appropriately defined as the "nominal protection rate." Moreover, they used the purchasing-power-parity effective rate expressed in real terms (deflated by Korea's WPI: 1965=100.0) for 1955-63 while using the nominal official exchange rate for 1964-82, resulting in conceptual inconsistency. Also, a question has been raised whether the measure of direct intervention (NPR_D) should be based on the effective exchange rate on exports or the official exchange rate. There are two reasons why the effective exchange rate on exports cannot be applied to measure NPR_D. First, we are dealing with agricultural products obtained by Korea almost entirely through imports. Second, even if there were years in which Korea exported rice (mostly in small amounts), farm producers had nothing to do with the effective exchange rate because the government had a monopoly on rice exports. The effect of this government monopoly is to be captured in indirect measure. As reference, however, the nominal protection rates (NPR_D) were measured for five products using the nominal effective exchange rate for both producer prices and consumer prices (see Appendix 34a and 34b).

relative prices and those that would have prevailed in the absence of price intervention are obtained, and are referred to as "nominal protection rates" (NPR).

Selection of Products

Three crops and two livestock products were selected for analysis: rice, barley, soybeans, beef, and pork. Rice was chosen because it is both the major food crop and the major tradable crop. Although its relative importance in Korea's total agricultural production is gradually declining, rice still constituted about 86 percent of the total value of agricultural output as of 1984. Korea exported rice until the mid-1960s, and has been an importing country since 1967, except for a few years of bumper crops. Barley is the second largest crop, comprising 3 to 4 percent of the total value of agricultural output. Although self-sufficiency was attained in the early 1970s (not by increased production but by a decline in consumption), barley is classified as importable because of the past record of imports. Korea was self-sufficient in soybeans until the mid-1960s, but the rate of import-dependency rose to 76 percent in 1984 and was expected to increase further in the future. Domestic production of wheat and corn is trivial, making the country dependent upon imports. There was therefore no point in including those two commodities in the analysis. Beef and pork were included because of their increasing importance in Korean agriculture.

Prices. To obtain border prices for each commodity, f.o.b. export prices were used for those years in which Korea exported the

commodity (after subtracting transport costs to major ports to get producer-price equivalents), and c.i.f. import prices were used for those years in which Korea imported the commodity. For those years in which Korea did not export or import significant quantities of a commodity, the import prices of Japan or Hong Kong were used as the proxy for border prices. Since prices differ by shipment, weighted annual average prices were obtained by dividing the total value of imports or exports by the quantity for each year. All producer prices are a weighted average of the government procurement price and the free market price, with the weights equal to the shares procured by the government and sold in the free market, respectively.

Since Korea imported mostly U.S. Californian Pearl or Carlose rice, the quality of which is similar to that of Korean rice, a price adjustment for quality difference was not made. As for beef and pork, since producers are selling live cattle and live swine, producer equivalent beef and pork prices were obtained by applying appropriate conversion ratios. In measuring the effect of price intervention on consumer prices, consumer equivalent border prices were obtained by adding handling and transportation costs to border prices in order to make the two prices comparable.

The estimated net effect of direct intervention in producer prices is presented in Table 8.1 and 8.2, that for consumer prices in Table 8'-1 and 8'-2. Measurement procedures are given in the footnote of each table.

The figures in columns (1)-(4) in Table 8-1 give the annual relative border prices of barley, soybeans, beef, and pork vis-a-vis that of rice evaluated at the official rate, while those in columns (5)-(9) give the relative border prices of the five products vis-a-vis that of non-agricultural goods (P_{NA}). The figures in columns (1)-(4) in Table 8-2 give the estimated direct relative nominal producer protection rates of barley, soybeans, beef, and pork vis-a-vis rice, and those in columns (5)-(9) represent the estimated direct nominal producer protection rates (NPR_D) of the five products vis-a-vis the prices of non-agricultural goods.

The estimated NPR_D in columns (5)-(9) in Table 8-2 indicates that production of rice, barley, soybeans, and beef relative to production of non-agricultural goods was, in general, increasingly protected during the 1960-84 period. Only in the case of pork did the policy result in a decline in the nominal rate of protection. The average nominal rate of protection (NPR_D) for rice rose from 14 percent during 1960-69 to almost 100 percent during 1980-84, while that for beef rose from 11 percent to as high as 138 percent. In contrast, the NPR_D for pork declined from 40 percent during 1960-69 to 11 percent during 1980-84. This implies that Korea's swine-raising industry continuously improved its efficiency.

The figures in columns (5)-(9) of Table 8'-2 give the estimated nominal protection rates for consumers. Contrary to the figures in the corresponding columns of Table 8-2, the positive sign represents the consumer tax and the negative sign consumer protection. For soybeans,

beef, and pork, the nominal rates of protection carry a positive sign throughout 1960-84, implying that consumers have been persistently taxed by consumption of these three products. For rice and barley there were several years during 1960-84 in which consumers were subsidized due to prices lower than border prices. Overall, the price distortions due to direct intervention in prices resulted in subsidizing farm producers and taxing consumers.

Effect of Indirect Intervention on Relative Prices

Apart from direct intervention in prices, other government actions affect the relative prices of agricultural products. Exchange rate overvaluation, along with import tariffs and quantitative restrictions, are thought to be the most important. To obtain a new series of prices that would have prevailed in the absence of policy intervention, the tradable part of the non-agricultural price index was first adjusted by eliminating protection measures (tariffs and import quotas). Then, product prices were adjusted for exchange rate overvaluation. A new series of adjusted domestic prices for the five products and the relative effects of indirect intervention are presented in Table 9 for producer prices and Table 9' for consumer prices.

Since the five products dealt with in this study are all tradable goods, and producers and consumers are equally affected by trade and exchange rate policy, the magnitude of indirect effects in relative terms is the same for both producer and consumer prices. The estimated results in Tables 9 and 9' clearly indicate that indirect price intervention had a negative effect on both producer and consumer

Table 8-1. Effect of Direct Price Intervention on Relative Producer Prices, 1960-84
(Relative Border Prices at E_o)

Year	Relative to Rice				Relative to P_{NA}				
	Barley/ Rice	Soybean/ Rice	Beef/ Rice	Pork/ Rice	Rice/ P_{NA}	Barley/ P_{NA}	Soybean/ P_{NA}	Beef/ P_{NA}	Pork/ P_{NA}
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
							1,000 won/MT		
1960	.599	.657	4.970	3.834	115.2	68.9	75.7	572.4	441.6
61	.411	.860	5.911	4.098	191.7	78.7	164.9	1,133.3	785.7
62	.735	.749	4.824	3.377	218.0	160.1	163.3	1,051.5	736.1
63	.684	.746	4.893	3.032	198.3	135.7	147.9	970.3	601.3
64	.649	.753	4.201	3.151	308.9	200.6	232.7	1,297.7	973.2
65	.491	.739	4.474	2.842	309.6	150.0	228.3	1,385.3	879.8
66	.823	.754	5.173	2.887	265.9	218.9	200.5	1,375.3	767.6
67	.749	.651	4.673	2.591	274.8	205.9	178.8	1,284.1	713.4
68	.604	.677	4.931	2.651	247.4	149.5	167.4	1,219.9	655.9
69	.511	.529	5.019	2.778	255.5	130.6	135.1	1,282.6	709.8
70	.640	.575	5.416	2.610	246.3	157.7	141.7	1,334.2	642.8
71	.637	.903	7.299	3.306	200.7	127.8	181.3	1,464.9	663.6
72	.677	.932	8.542	3.797	190.1	128.7	177.2	1,623.6	721.6
73	.612	.846	6.308	2.560	338.5	207.1	286.3	2,135.3	866.7
74	.560	.624	3.952	2.511	476.2	266.5	296.9	1,881.9	1,195.7
75	.684	.601	3.618	2.535	465.4	318.2	279.8	1,683.5	1,179.5
76	.787	.924	6.412	4.853	267.4	210.5	247.1	1,714.4	1,297.7
77	.775	1.372	8.662	6.539	205.0	158.8	281.2	1,775.5	1,340.4
78	.528	.771	5.957	7.801	272.9	144.1	210.5	1,625.7	2,128.9
79	.645	1.024	9.029	8.673	195.1	125.9	200.0	1,761.7	1,692.3
80	.666	.786	8.660	6.316	238.3	158.8	187.4	2,063.8	1,505.4
81	.651	.750	7.973	9.169	262.8	171.2	197.0	2,095.7	2,410.1
82	.495	.587	7.202	9.952	285.2	127.9	151.6	1,859.9	2,570.0
83	.426	.565	7.282	6.210	282.1	120.2	159.2	2,054.0	1,751.6
84	.551	.556	5.860	4.915	305.1	168.0	169.6	1,787.8	1,499.4

Source: Computed from Appendix 13, 16a and 33a.

Table 8-2. Effect of Direct Price Intervention on Relative Producer Prices, 1960-84
(Direct Nominal Protection Rates:NPR_D)

Year	Relative to Rice a/				Relative to P_{NA} b/				
	NPR (Barley/ Rice)	NPR (Soybean/ Rice)	NPR (beef/ Rice)	NPR Pork/ Rice)	NPR (Rice/ NA)	NPR (barley/ NA)	NPR (soybean/ NA)	NPR (Beef/ NA)	NPR (Pork/ NA)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1960	.080	.391	-.006	-.109	.848	.996	1.571	.837	.646
61	.739	-.129	-.258	-.231	.280	1.226	.115	-.051	-.015
62	.021	.007	-.088	.248	.145	.169	.153	.044	.429
63	.202	-.060	-.394	-.166	.824	1.192	.934	.105	.521
64	.331	.294	-.338	-.073	.172	.561	.516	-.224	.087
65	.417	.468	.076	.369	-.088	.292	.338	-.020	.247
66	-.239	.533	.037	.155	-.061	-.286	.439	-.026	.084
67	-.124	1.144	.336	.579	-.107	-.217	.914	.193	.410
68	.010	.225	.389	.896	.051	.061	.287	.460	.993
69	.121	.382	.179	.209	.149	.288	.587	.355	.389
70	-.132	.750	.140	.462	.208	.049	1.114	.377	.765
71	-.037	-.085	-.184	.126	.719	.655	.574	.402	.936
72	-.088	-.127	-.277	-.304	1.101	.915	.834	.519	.463
73	-.014	.078	.009	.399	.198	.173	.282	.200	.664
74	-.057	.245	.253	.143	.007	-.051	.254	.261	.150
75	-.144	.253	.187	.316	.110	-.050	.391	.317	.461
76	-.361	-.065	-.083	-.225	1.028	.292	.888	.852	.565
77	-.138	-.189	-.119	-.428	1.480	1.137	1.011	1.186	.419
78	.221	.305	.530	-.365	.951	1.383	1.547	1.986	.240
79	-.104	-.420	-.229	-.647	1.864	1.566	.661	1.210	.011
80	-.153	.194	-.258	-.500	1.361	1.001	1.819	.752	.181
81	-.138	.558	.024	-.487	1.136	.848	2.327	1.186	.096
82	.236	.817	.327	-.547	1.036	1.517	2.670	1.702	.078
83	.470	1.081	.437	-.355	.790	1.631	2.725	1.572	.154
84	.143	1.038	.637	-.366	.652	.889	2.367	1.706	.048

Source: Computed from Table 8-1 and Appendix 32a.

a/ $\dfrac{\text{Domestic producer prices of tradables/Domestic producer price of rice}}{\text{Border prices of tradables at } E_o/\text{Border prices of rice at } E_o} - 1$

b/ (Domestic producer price / P_{NA}) / (Border price / P_{NA}) - 1

Table 8'-1. Effect of Direct Price Interventions on Relative Consumer Prices, 1960-1984
(Relative Consumer Equivalent Border Prices at $E_{o'}$)

Year	Relative to Rice [a]				Relative to P_{NA} [b]				
	Barley/ Rice	Soybean/ Rice	Beef/ Rice	Pork/ Rice	Rice/ P_{NA}	Barley/ P_{NA}	Soybean/ P_{NA}	Beef/ P_{NA}	Pork/ P_{NA}
	(1)	(2)	(3)	(4)	(5)	(6)	W1,000/MT (7)	(8)	(9)
1960	.738	.764	5.146	3.670	161.9	119.6	123.7	833.2	594.2
61	.586	.876	6.844	4.031	235.2	138.0	206.0	1,421.7	948.2
62	.798	.758	5.099	3.499	264.2	211.0	200.3	1,347.3	924.4
63	.791	.738	4.741	2.974	264.6	209.3	195.2	1,254.2	786.8
64	.794	.764	4.266	3.211	366.5	291.1	280.1	1,563.4	1,176.5
65	.632	.787	4.847	3.201	346.2	218.9	272.4	1,678.1	1,108.0
66	.903	.818	5.383	3.167	306.6	276.8	250.7	1,650.5	970.9
67	.843	.739	4.948	2.928	318.0	268.0	254.1	1,573.4	928.3
68	.643	.757	5.554	3.138	295.7	190.3	223.7	1,642.2	928.3
69	.595	.660	5.880	3.277	295.7	176.0	195.2	1,738.7	969.1
70	.696	.675	6.189	3.037	292.0	203.3	197.0	1,806.9	886.6
71	.638	.919	7.539	3.687	264.7	168.7	243.2	1,995.8	976.1
72	.716	1.036	8.641	3.991	253.0	181.2	262.1	2,186.3	1,009.7
73	.602	.899	6.620	2.915	408.2	245.9	367.0	2,702.6	1,190.1
74	.618	.766	4.595	2.858	528.7	322.4	495.1	2,429.6	1,507.1
75	.683	.683	4.805	2.835	559.1	381.7	381.9	2,239.8	1,585.2
76	.803	1.072	6.569	4.805	365.8	293.8	392.1	2,403.3	1,758.8
77	1.016	1.443	8.684	5.957	297.8	302.6	429.7	2,585.8	1,773.9
78	.790	1.015	6.393	6.891	382.8	302.6	388.3	2,412.4	2,637.5
79	.780	1.242	7.578	6.394	327.7	261.5	407.0	2,483.1	2,095.1
80	.838	.878	6.738	4.538	415.1	348.0	364.3	2,797.8	1,888.5
81	.866	.845	6.299	6.224	472.9	409.6	399.7	2,978.5	2,943.3
82	.626	.783	6.858	6.678	456.1	285.7	357.3	2,759.5	3,042.1
83	.532	.745	6.821	4.894	441.9	235.2	329.5	3,014.2	2,162.7
84	.562	.788	5.288	3.568	586.7	284.8	399.3	2,675.5	1,888.8

Source: Computed from Appendix 13, 16b and 33b.

a/ $\dfrac{\text{Border prices of tradables at } E_0 + \text{Handling and transportation costs}}{\text{Border price of rice at } E_0 + \text{Handling and transportation costs}}$

b/ (Border prices of tradables at E_0 + Handling and transportation costs) / P_{NA}

Table 8'-2. Effect of Direct Price Intervention on Relative Consumer Prices, 1960-1984
(Direct Nominal Protection Rates : NPR^C_D)

Year	Relative to Rice [a]				Relative to PNA [b]				
	NPR^C_D (Barley/ Rice)	NPR^C_D (Soybean/ Rice)	NPR^C_D (Beef/ Rice)	NPR^C_D (Pork/ Rice)	NPR^C_D (Rice/ NA)	NPR^C_D (Barley/ NA)	NPR^C_D (Soybean/ NA)	NPR^C_D (Beef/ NA)	NPR^C_D (Pork/ NA)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1960	-.102	-.177	.389	.084	.523	.368	-.793	.994	.529
61	.266	-.152	.898	-.133	.177	.498	-.882	.232	.026
62	-.040	-.011	.354	.175	.032	-.089	.021	.398	.212
63	-.028	.035	-.035	-.061	.494	.451	.546	.442	.483
64	.078	.286	.819	-.032	.062	.136	.281	.882	.028
65	.161	.309	.254	.383	-.114	.029	.168	.111	.226
66	-.228	.411	.229	.442	-.136	-.326	.219	.862	.246
67	-.131	.790	.435	.688	-.184	-.291	.461	.171	.378
68	-.078	.112	.881	.919	-.090	-.151	.012	.638	.745
69	-.059	.303	.716	.636	-.026	-.084	.269	.671	.593
70	-.137	.601	.616	.587	.031	-.110	.651	.666	.636
71	.017	.848	.333	.500	.271	.293	.332	.694	.906
72	-.236	-.146	-.036	-.001	.700	.299	.451	.639	.698
73	-.058	.063	.389	.584	.021	-.038	.086	.337	.618
74	-.254	.186	.673	.433	-.142	-.360	.017	.436	.238
75	-.303	.255	.743	.680	-.093	-.308	.138	.580	.523
76	-.416	-.052	.246	.863	.466	-.144	.389	.826	.559
77	-.435	-.172	.118	-.185	.785	.008	.478	.995	.455
78	-.271	.190	.546	-.146	.344	-.020	.599	1.077	.148
79	-.456	.124	.153	-.287	.605	-.127	.405	.858	.145
80	-.612	.102	.113	-.208	.508	-.418	.653	.670	.187
81	-.518	.343	.324	-.244	.426	-.301	.916	.888	.078
82	-.418	.354	.487	-.338	.336	-.188	.890	1.076	-.076
83	-.896	.653	.527	-.149	.329	.201	1.196	1.029	.131
84	-.873	.599	.855	-.108	.139	.057	.822	1.113	.916

Source: Computed from Table 8'-1 and Appendix 32b.

a) $$\frac{\text{Domestic consumer prices of tradables / Domestic consumer price of rice}}{\text{Consumer equiv. border prices of tradables / Consumer equiv. border price of rice}} - 1$$

b) $$\frac{\text{Domestic consumer prices / } P_{NA}}{\text{Consumer equiv. border prices / } P_{NA}} - 1$$

Figure 2

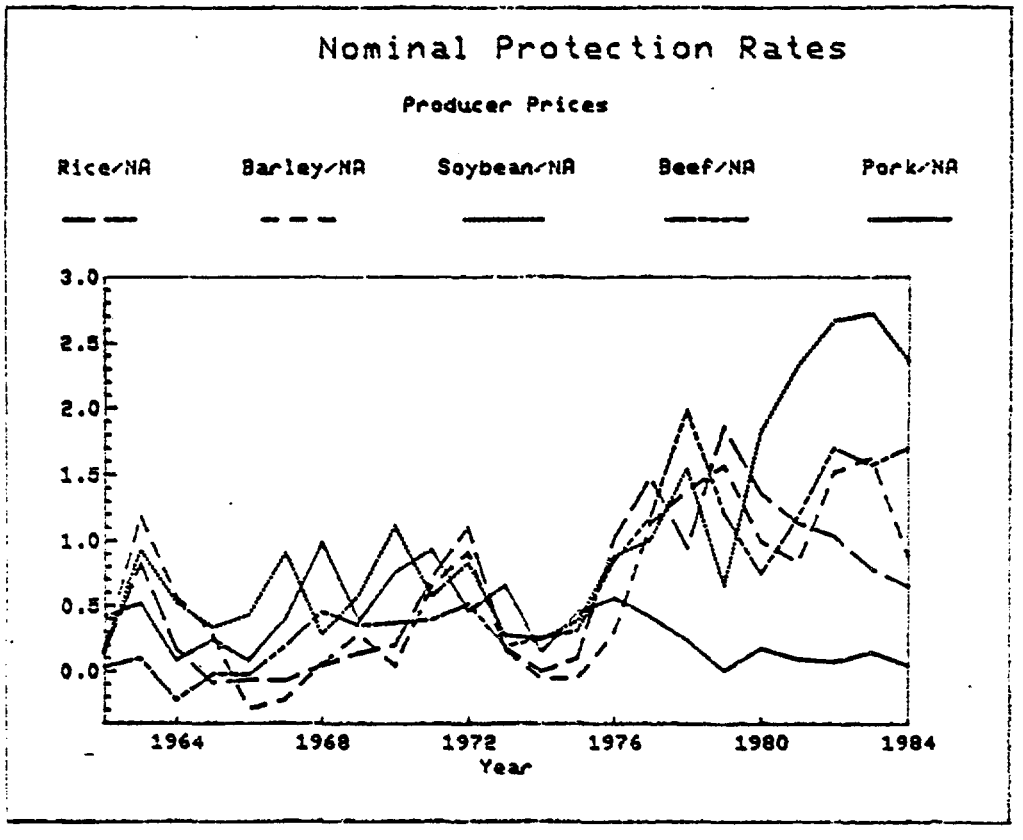
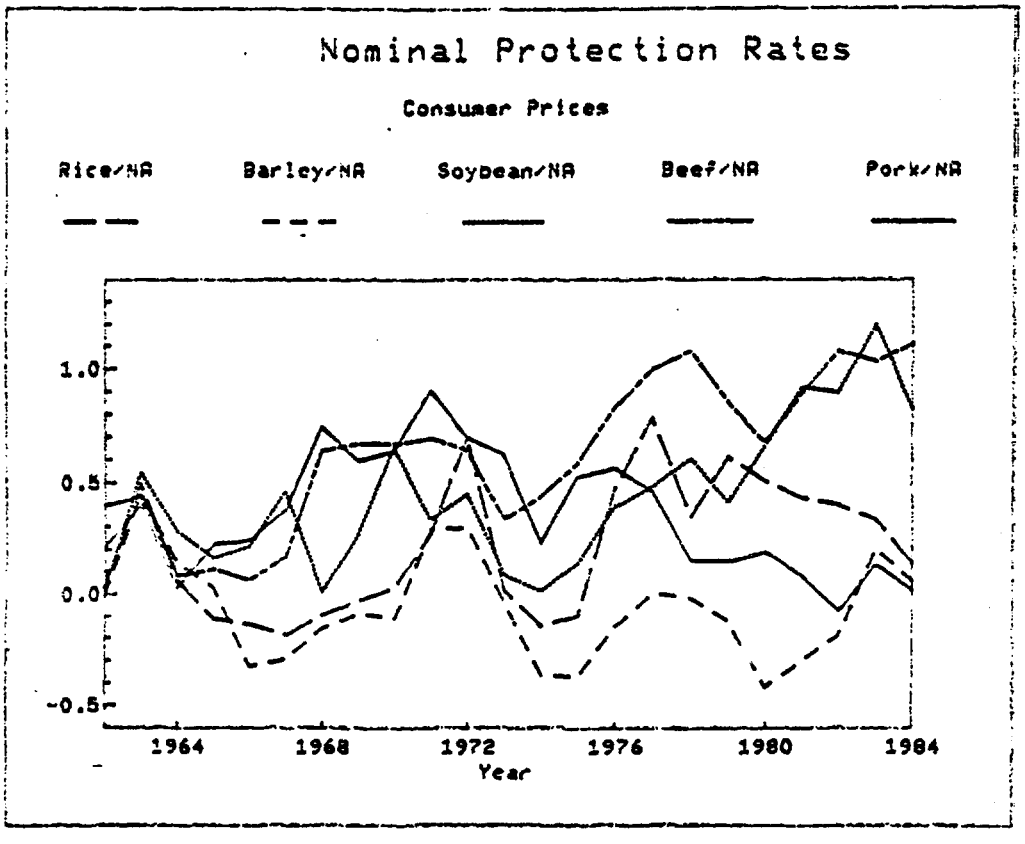

Nominal Protection Rates
Producer Prices
Rice/NA
Barley/NA
Soybean/NA
Beef/NA
Pork/NA
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1964
1968
1972
1976
1980
1984
Year

Figure 3


Nominal Protection Rates
Consumer Prices
Rice/NR
Barley/NR
Soybean/NR
Beef/NR
Pork/NR
1.0
0.5
0.0
-0.5
1964
1968
1972
1976
1980
1984
Year

prices throughout 1960-84. To put it differently, both the producer and consumer-equivalent border prices used in measuring the effect of direct intervention were underestimated by the ratios calculated in column (6) due to overvaluation of the Korean won. For instance, the maintenance of an overvalued exchange rate resulted in the border prices of these five products being on average 20 percent lower than they would otherwise have been during the 1960s, about 15 percent lower during the 1970s, and 7-8 percent lower during 1980-84.

Using a new series of product prices and a non-agricultural price index which was adjusted to indirect price intervention, a new series of relative prices and "real protection rates" (NPR_T) for each product was calculated, as shown in Table 10-2 for producer prices and Table 10'-2 for consumer prices.

Columns (5)-(9) of Table 10-2 give estimated relative real protection rates (NPR_T). One can observe from the estimated results that rice, barley, and beef were subject to negative protection in most years during the 1960s, average NPR_T being (-)27 percent for rice, (-)19 percent for barley, and (-)9 percent for beef. But with an increasing subsidy since the early 1970s, the real protection rates have been consistently increasing for all the products except pork. The real protection rate rose to 74 percent for rice, 91 percent for barley, 198 percent for soybeans, and 111 percent for beef, whereas that for pork increased from (-)9 percent during 1960-69 to (-)5 percent during 1980-84.

Additional Effects of Intervention on Relative Value Added

The present section attempts to measure the combined effects of product and input price intervention, including exchange rate policy, on value added. This measure allows for the fact that the domestic price of inputs, like that of output, may differ from their border prices and thus affect the value added of the production process. This is referred to as the "effective rate of protection" (ERP). It is the percentage difference between the value added (VA) expressed in domestic market prices and the value added (VA*) expressed in border prices converted at the equilibrium exchange rate.

The inputs considered for the three crops are tradable ones: fertilizer, pesticides, and farm machinery. These three items account for approximately 85-90 percent of the purchased inputs in the production process of the three crops (excluding hired labor and irrigation water). Other cost items, such as seeds, miscellaneous materials, and depreciation of farm facilities are excluded because of their non-tradability and their negligible share of costs. For beef and pork, feed corn is the only input considered.

As the price of fertilizer, the average unit value (per metric ton) was used for both domestic and border prices obtained from the total value of consumption divided by total quantity used. The c.i.f. import price was used when imported (prior to 1972), and f.o.b. export price when exported (after 1972). For pesticides the domestic and border price were simply assumed to be the same, since it is almost

Table 9. Indirect Effects on Relative Producer Prices, 1960-1984

Year	Prices Adjusted to Indirect Effects [a]					NPR_I [b]
	Rice/P_{NA}	Barley/P_{NA}	Soybean/P_{NA}	Beef/P_{NA}	Pork/P_{NA}	
	(1)	(2)	₩1000/MT (3)	(4)	(5)	(6)
1960	394.4	254.9	360.8	1,948.2	1,346.9	-.46
61	383.7	274.0	287.3	1,682.0	1,209.5	-.36
62	403.7	382.8	384.6	1,775.4	1,700.7	-.38
63	652.8	537.1	516.2	1,935.8	1,651.1	-.45
64	549.9	475.4	535.7	1,528.9	1,606.0	-.34
65	386.8	269.1	419.6	1,861.5	1,504.6	-.27
66	366.0	229.3	423.1	1,964.2	1,220.1	-.32
67	362.7	238.2	505.9	2,264.9	1,486.6	-.32
68	398.7	243.3	338.4	2,730.3	2,004.1	-.35
69	442.3	253.4	323.1	2,611.9	1,485.1	-.34
70	436.4	242.5	439.2	2,693.8	1,664.3	-.32
71	515.2	315.9	426.0	3,067.5	1,917.9	-.33
72	538.3	332.3	438.0	3,323.4	1,423.0	-.26
73	518.6	313.0	472.7	3,300.4	1,857.5	-.22
74	661.8	349.2	514.0	3,276.9	1,898.6	-.28
75	688.8	402.9	518.9	2,956.5	2,297.9	-.25
76	654.8	327.1	561.5	3,914.5	2,444.8	-.17
77	595.0	397.8	663.0	4,549.5	2,230.5	-.15
78	704.5	394.9	616.8	5,584.4	3,036.0	-.13
79	688.0	397.7	488.4	4,792.4	2,107.1	-.19
80	695.8	392.9	653.3	4,472.3	2,199.1	-.19
81	658.4	369.2	768.6	5,373.5	3,097.8	-.15
82	590.9	361.8	629.9	5,645.4	2,662.0	-.11
83	554.3	347.2	651.0	5,797.8	2,219.4	-.09
84	547.0	344.4	619.5	5,248.6	1,705.0	-.08

Source: Computed from Appendix 12, 13, 14, 16a and 33a.

[a] $$Pi = \frac{E^*}{E_o} / \left[\frac{E^*}{E_o} \beta P_{NA}^T / (1 + t_{na}) + (1 - \beta) P_{NA}^{NT} \right]$$

where Pi = Donestic producer price of tradable agricultural output

E^* = Free trade equilibrium exchange rate

E_o = Nominal exchange rate

β = Share of tradable part of P (CPI)

P_{NA}^T = Index of prices of tradable part of P (CPI)

P_{NA}^{NT} = Index of prices of nontradables of P (CPI)

t_{na} = Effect of trade taxes on P

[b] $$(Pi/P_{NA}) / \left[Pi * \frac{E^*}{E_o} / \left(\frac{E^*}{E_o} \beta P_{NA}^T / (1 + t_{na}) + (1 - \beta) P_{NA}^{NT} \right) \right] - 1$$

$$= \left[\frac{E^*}{E_o} \beta P_{NA}^T / (1 + t_{na}) + (1 - \beta) P_{NA}^{NT} \right] / P_{NA} \frac{E^*}{E_o} - 1$$

Table 9' Indirect Effect on Relative Consumer Prices, 1960-1984

Year	Prices Adjusted to Indirect Effects a)					NPR_I b)
	Rice/P_{NA}	Barley/P_{NA}	Soybean/P_{NA}	Beef/P_{NA}	Pork/P_{NA}	
	(1)	(2)	₩1,000/MT (3)	(4)	(5)	(6)
1960	457.0	303.1	411.3	3,078.6	1,683.6	-.46
61	432.8	321.3	321.3	2,872.7	1,511.9	-.36
62	441.0	338.3	330.8	3,046.2	1,812.8	-.38
63	713.6	548.5	544.7	3,264.2	1,992.7	-.45
64	591.0	502.3	544.7	2,569.5	1,837.2	-.34
65	420.5	308.6	433.1	2,555.9	1,861.5	-.27
66	388.5	273.4	448.2	2,569.9	1,773.8	-.32
67	383.7	281.0	548.7	2,724.1	1,891.3	-.32
68	412.4	247.6	347.1	4,124.5	2,483.4	-.35
69	433.8	243.0	373.2	4,377.0	2,325.3	-.34
70	441.5	265.4	477.0	4,415.3	2,127.6	-.32
71	502.3	321.8	483.5	5,049.8	2,777.4	-.33
72	579.8	317.3	512.6	4,830.4	2,311.3	-.26
73	536.9	304.8	513.3	4,653.9	2,479.4	-.22
74	626.7	285.0	569.2	4,816.6	2,599.0	-.28
75	675.8	321.6	579.2	4,716.9	3,219.4	-.25
76	645.3	302.7	655.5	5,280.6	3,297.4	-.17
77	623.0	357.6	744.4	6,050.6	3,025.3	-.15
78	591.7	341.1	714.5	5,764.7	3,483.1	-.13
79	647.4	281.1	704.1	5,656.4	2,951.9	-.19
80	770.0	250.6	757.1	5,776.0	2,761.8	-.19
81	791.0	336.0	862.1	6,594.6	3,722.4	-.15
82	715.4	260.7	758.8	6,438.1	3,157.5	-.11
83	644.6	310.0	794.2	6,713.0	2,685.8	-.09
84	626.4	326.5	789.5	6,135.3	1,993.1	-.08

Source: Computed from Table 7b and Appendix 12, 13, 14, 16b, and 33b.
a),b) : See Foot Notes for Table 9.

Table 10-1 Effect of Direct and Indirect Price Interventions on Relative Producer Prices, 1960-1984
(Relative Border Prices at E^*)

Year	Relative to Rice a)				Relative to P^*_{NA} b)				
	Barley/ Rice	Soybean/ Rice	Beef/ Rice	Pork/ Rice	Rice/ P^*_{NA}	Barley/ P^*_{NA}	Soybean/ P^*_{NA}	Beef/ P^*_{NA}	Pork/ P^*_{NA}
	(1)	(2)	(3)	(4)	(5)	(6)	₩1,000/MT (7)	(8)	(9)
1960	.599	.657	4.970	3.834	330.7	193.7	217.3	1,642.7	1,266.7
61	.411	.860	5.911	4.098	300.0	122.9	257.8	1,775.2	1,231.2
62	.735	.749	4.824	3.377	352.5	259.0	263.9	1,698.4	1,188.5
63	.684	.746	4.893	3.832	357.7	245.3	267.2	1,751.8	1,885.4
64	.649	.753	4.201	3.151	470.2	305.3	353.6	1,974.2	1,480.8
65	.491	.739	4.474	2.842	424.9	208.3	313.6	1,900.6	1,207.1
66	.823	.754	5.173	2.887	389.1	320.7	293.8	2,014.0	1,124.4
67	.749	.651	4.673	2.596	487.1	364.7	264.6	1,901.9	1,056.6
68	.684	.677	4.931	2.651	378.8	229.0	256.4	1,867.6	1,004.1
69	.511	.529	5.819	2.778	384.3	196.6	203.4	1,929.9	1,067.8
70	.640	.575	5.416	2.610	361.4	231.2	207.7	1,956.8	942.8
71	.637	.903	7.299	3.306	300.8	190.9	270.9	2,188.7	991.3
72	.677	.932	8.542	3.797	257.1	173.9	239.7	2,194.8	975.5
73	.612	.846	6.308	2.560	437.4	267.4	369.7	2,758.4	1,119.7
74	.560	.624	3.952	2.511	656.2	367.3	409.4	2,594.1	1,648.3
75	.684	.601	3.618	2.535	620.9	424.5	373.2	2,245.8	1,573.4
76	.787	.924	6.412	4.853	321.8	253.3	297.4	2,062.9	1,561.5
77	.775	1.372	8.662	6.539	239.9	185.8	329.1	2,078.8	1,568.7
78	.528	.771	5.957	7.801	313.6	165.6	241.9	1,868.2	2,446.4
79	.645	1.024	9.029	8.673	248.9	154.8	245.8	2,166.9	2,081.4
80	.666	.786	8.660	6.317	295.1	196.6	232.8	2,555.7	1,864.1
81	.651	.750	7.973	9.169	309.3	201.3	231.8	2,465.7	2,835.6
82	.495	.587	7.282	9.952	298.7	144.8	178.6	2,893.8	2,893.3
83	.426	.565	7.282	6.210	308.3	131.4	174.8	2,245.8	1,914.5
84	.551	.556	5.860	4.915	329.7	181.6	183.2	1,932.2	1,620.6

Source: Computed from Appendix 12, 13, 14, 16a and 33a.

a) $$\frac{E^* \times \text{Border price of tradables (in US dollers)}}{E^* \times \text{Border price of rice (in US dollers)}}$$

b) $$\frac{E^* \times \text{Border price of tradables (in US dollers)}}{P^*_{NA}}$$

where $$P^*_{NA} = \frac{E^*}{E_o} \beta \frac{P^T_{NA}}{1 + t_{na}} + (1 - \beta) P^{NT}_{NA}$$

Table 10'-1 Effect of Direct and Indirect Price Interventions on Relative Consumer Prices, 1960-1984
(Relative Consumer Equivalent Border Prices at E^*)

Year	Relative to Rice[a]				Relative to P^*_{NA}[b]				
	Barley/ Rice	Soybean/ Rice	Beef/ Rice	Pork/ Rice	Rice/ P^*_{NA}	Barley/ P^*_{NA}	Soybean/ P^*_{NA}	Beef/ P^*_{NA}	Pork/ P^*_{NA}
	(1)	(2)	(3)	(4)	(5)	(6)	W1,000/MT (7)	(8)	(9)
1960	.658	.704	5.046	3.761	378.7	249.3	266.7	1,910.7	1,424.0
61	.584	.868	5.989	4.066	333.0	167.9	289.0	1,994.5	1,354.1
62	.766	.753	4.953	3.432	385.2	295.1	290.2	1,908.2	1,322.1
63	.734	.743	4.828	3.009	403.6	296.4	300.0	1,948.9	1,214.6
64	.731	.758	4.235	3.183	515.2	376.2	390.7	2,182.1	1,639.7
65	.581	.769	4.712	3.070	455.6	264.5	350.3	2,146.7	1,398.8
66	.874	.795	5.309	3.066	424.9	371.5	337.8	2,255.4	1,302.6
67	.808	.745	4.849	2.802	445.8	360.4	332.1	2,161.3	1,249.1
68	.629	.726	5.313	2.951	421.2	264.7	305.8	2,237.8	1,242.7
69	.563	.611	5.553	3.088	420.3	236.8	256.7	2,334.1	1,297.7
70	.677	.640	5.919	2.888	402.5	272.6	257.5	2,382.1	1,162.1
71	.632	.913	7.456	3.558	357.6	225.9	326.5	2,666.3	1,272.5
72	.787	1.813	8.615	3.946	319.8	225.5	323.2	2,748.4	1,259.8
73	.684	.889	6.562	2.851	508.7	307.1	452.3	3,338.4	1,450.3
74	.596	.726	4.412	2.754	706.2	420.5	512.4	3,115.6	1,944.8
75	.583	.663	3.907	2.760	710.1	485.8	470.5	2,774.7	1,959.7
76	.801	1.055	6.551	4.811	422.2	338.3	445.3	2,765.5	2,030.9
77	.997	1.437	8.681	6.003	336.2	335.1	483.2	2,918.7	2,018.5
78	.765	.991	6.269	6.978	423.5	324.2	419.8	2,655.2	2,955.2
79	.776	1.211	7.784	6.718	367.5	285.2	445.0	2,860.7	2,468.9
80	.814	.864	7.014	4.786	464.6	378.0	401.6	3,258.7	2,223.8
81	.845	.836	6.461	6.518	516.3	436.4	431.5	3,335.7	3,361.1
82	.617	.769	6.136	6.915	485.7	299.5	373.4	2,980.5	3,358.7
83	.526	.735	6.847	4.970	467.8	246.1	343.9	3,203.2	2,324.7
84	.561	.778	5.386	3.627	532.3	298.9	414.1	2,824.1	1,930.6

Source: Computed from Appendix 12, 13, 14, 16b, and 33b.

a) $$\frac{\text{Border prices of tradables at } E^* + \text{Handling and transportation costs}}{\text{Border prices of rice at } E^* + \text{Handling and transportation costs}}$$

b) $$\frac{\text{Border prices at } E^* + \text{Handling and transportation costs}}{P^*_{NA}}$$

where $$P^{**}_{NA} = \frac{E^*}{E_0}\ \beta \frac{P^*_{NA}}{1 + t_{na}} + (1 - \beta)\ P^{NT}_{NA}$$

Table 10-2 Effect of Direct and Indirect Price Interventions on Relative Producer Prices, 1960-1984
(Total Nominal Protection Rates: NPR_T)

Year	Relative to Rice a)				Relative to P^*_{NA} b)				
	NPR_T (Barley/ Rice)	NPR_T (Soybean/ Rice)	NPR_T (Beef/ Rice)	NPR_T (Pork/ Rice)	NPR_T (Rice/ NA)	NPR_T (Barley/ NA)	NPR_T (Soybean/ NA)	NPR_T (Beef/ NA)	NPR_T (Pork/ NA)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1960	.088	.391	-.086	-.109	-.356	-.383	-.184	-.368	-.426
61	.733	-.129	-.258	-.231	-.182	.426	-.287	-.394	-.372
62	.021	.007	-.088	.248	-.292	-.277	-.286	-.354	-.115
63	.202	.060	-.394	-.166	.011	.213	.071	-.388	-.157
64	.331	.294	-.338	-.073	-.230	.026	-.082	-.490	-.286
65	.417	.468	.076	.369	-.336	-.058	-.024	-.285	-.090
66	-.239	.533	.037	.155	-.359	-.512	-.018	-.335	-.260
67	-.124	1.144	.336	.579	-.397	-.471	.293	-.194	-.048
68	.010	.225	.389	.896	-.314	-.308	-.160	-.047	.302
69	.121	.382	.179	.289	-.236	-.144	.054	-.099	-.077
70	-.132	.750	.140	.462	-.177	-.285	.442	-.061	.284
71	-.037	-.085	-.184	.126	.150	.108	.053	-.061	.296
72	-.088	-.127	-.277	-.304	.553	.418	.356	.123	.082
73	-.014	.078	.089	.399	-.079	-.091	-.007	-.071	.288
74	-.057	.245	.253	.143	-.270	-.312	-.091	-.085	-.166
75	-.144	.253	.187	.316	-.168	-.288	.043	-.013	.096
76	-.361	-.065	-.083	-.225	.679	.073	.569	.539	.381
77	-.138	-.189	-.119	-.428	1.119	.826	.719	.867	.213
78	.221	.305	.538	-.365	.698	1.072	1.216	1.598	.079
79	-.184	-.420	-.229	-.647	1.329	1.086	.350	.797	-.178
80	-.153	.194	-.258	-.580	.906	.616	1.276	.415	-.046
81	-.138	.558	.237	-.489	.815	.564	1.628	.858	-.068
82	.236	.817	.327	-.547	.809	1.236	2.287	1.480	-.181
83	.470	1.081	.437	-.355	.638	1.407	2.408	1.353	.056
84	.143	1.038	.637	-.366	.529	.748	2.115	1.503	-.038

Source: Computed from Table 10-1 and Appendix 32a.

a) $$\frac{\text{Domestic producer prices of tradables}}{\text{Domestic producer price of rice}} \Big/ \frac{\text{Border prices of tradables at } E^*}{\text{Border price of rice at } E^*}$$

b) $$\frac{\text{Domestic producer prices} \,/\, P_{NA}}{\text{Border price at } E^* \,/\, P^*_{NA}} - 1$$

where $$P^*_{NA} = \frac{E^*}{E_o}\left(\beta \frac{P^T_{NA}}{1 + t_{na}} + (1-\beta) P^{NT}_{NA}\right)$$

Table 10'-2 Effect of Direct and Indirect Price Interventions on Relative Consumer Prices, 1960-1984
(Total Nominal Protection Rates: NPR_T^C)

Year	Relative to Rice [a]				Relative to P_{NA} [b]				
	NPR_T^C (Barley/ Rice)	NPR_T^C (Soybean/ Rice)	NPR_T^C (Beef/ Rice)	NPR_T^C (Pork/ Rice)	NPR_T^C (Rice/ NA)	NPR_T^C (Barley/ NA)	NPR_T^C (Soybean/ NA)	NPR_T^C (Beef/ NA)	NPR_T^C (Pork/ NA)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1960	.008	.278	.335	-.020	-.349	-.344	-.168	-.131	-.362
61	.472	-.145	.108	-.141	-.169	.224	-.289	-.079	-.286
62	.001	-.004	.395	.198	-.292	-.291	-.295	-.013	-.152
63	.048	.027	-.053	-.072	-.021	.0251	.006	-.072	-.091
64	.163	.216	.027	-.023	-.252	-.121	-.082	-.224	-.262
65	.263	.339	.290	.442	-.327	-.149	-.098	-.131	-.029
66	-.195	.452	.246	.489	-.376	-.498	-.095	-.223	-.071
67	-.094	.919	.464	.759	-.418	-.472	.118	-.147	.024
68	-.046	.160	.882	1.040	-.361	-.390	-.260	.202	.303
69	-.085	.408	.817	.736	-.315	-.319	-.035	.245	.189
70	-.112	.688	.689	.669	-.252	-.336	.263	.254	.248
71	.014	.055	.348	.554	-.059	-.046	-.008	.268	.462
72	-.226	-.127	-.033	.010	.348	.044	.177	.304	.362
73	-.060	.075	.321	.620	-.770	-.229	-.119	.082	.327
74	-.237	.251	.742	.483	-.357	-.509	-.196	.120	-.047
75	-.303	.293	.787	.726	-.286	-.502	-.076	.275	.232
76	-.414	-.037	.249	.043	.270	-.257	.223	.587	.349
77	-.424	-.168	.119	-.191	.581	-.090	.314	.768	.278
78	-.247	.218	.554	-.156	.215	-.085	.479	.887	.025
79	-.441	-.102	.122	-.321	.431	-.199	.285	.606	-.029
80	-.501	.119	.069	-.251	.340	-.464	.499	.433	.004
81	-.497	.358	.290	-.277	.307	-.343	.775	.686	-.056
82	-.410	.388	.467	-.362	.311	-.225	.808	.923	-.163
83	-.086	.676	.521	-.162	.256	.147	1.104	.999	.053
84	-.071	.628	.846	-.123	.885	.007	.757	1.002	-.049

Source: Computed from Table 10'-1 and Appendix 32b.

a) $$\frac{\dfrac{\text{Domestic consumer prices of tradables}}{\text{Domestic consumer price of rice}}}{\dfrac{\text{Consumer equivalent border prices of tradables at } E^*}{\text{Consumer equivalent border price of rice at } E^*}} - 1$$

b) $$\frac{\text{Domestic consumer prices} \,/\, P_{NA}}{\text{Consumer equivalent border prices at } E^* \,/\, P_{NA}^*} - 1$$

where $$P_{NA}^* = \frac{E^*}{E_0} \beta \frac{P_{NA}^T}{1 + t_{na}} + (1 - \beta) P_{NA}^{NT}$$

Figure 4

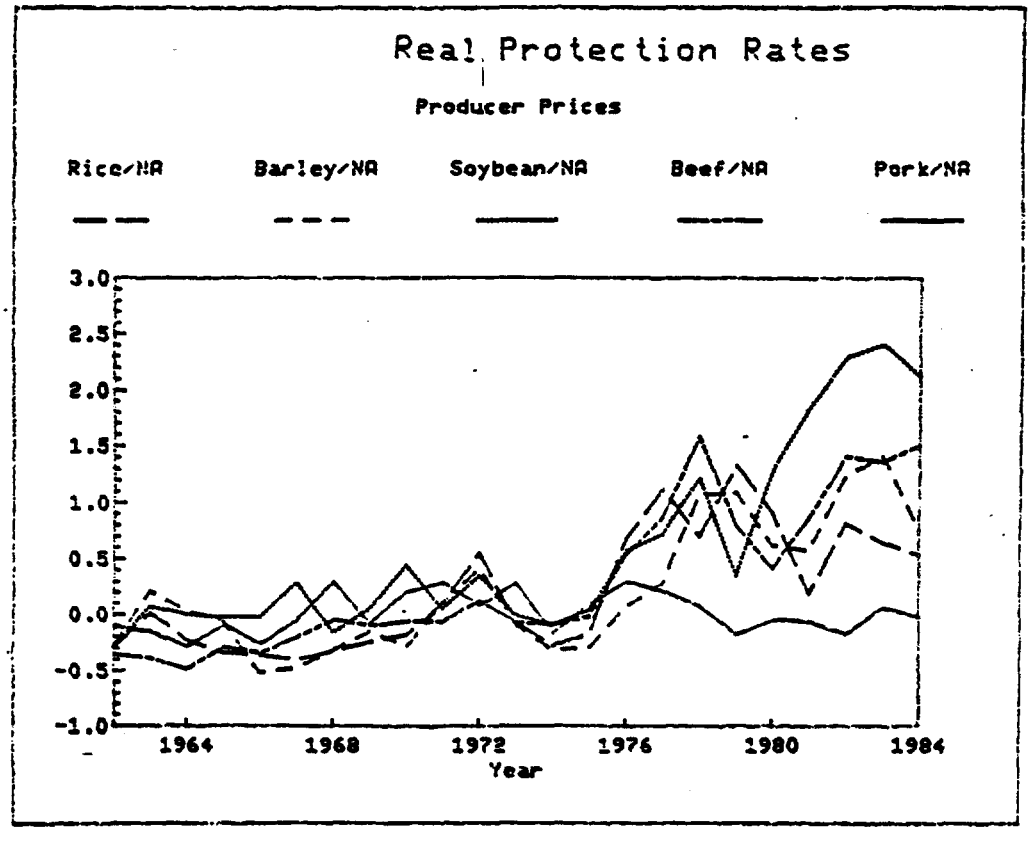
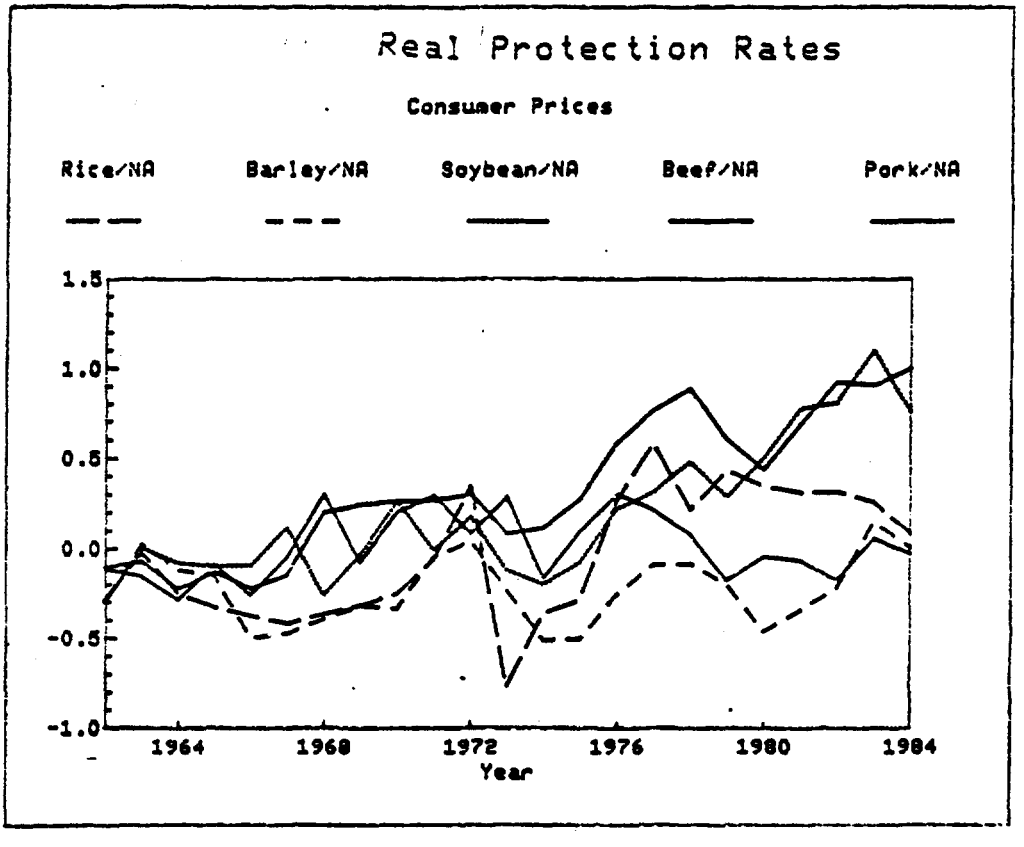

Real Protection Rates
Producer Prices
Rice/NA
Barley/NA
Soybean/NA
Beef/NA
Pork/NA
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
1964
1968
1972
1976
1980
1984
Year

Figure 5


Real Protection Rates
Consumer Prices
Rice/NA
Barley/NA
Soybean/NA
Beef/NA
Pork/NA
1.5
1.0
0.5
0.0
-0.5
-1.0
1964
1968
1972
1976
1980
1984
Year

impossible to obtain reasonably comparable domestic and border prices where a large number of pesticides are in use. Nevertheless, its input coefficient a_{Aj} was included in the analysis for want of a better estimate. In the case of farm machinery, the 8 HP power tiller was chosen as representative of both domestic and border prices. But in calculation of its input coefficient, the depreciation cost inclusive ofall types of farm implements in use was entered, due to the extreme difficulty of isolating the share of depreciation by each individual type. As for feed corn, the border price (evaluated at official exchange rate E_o) plus 7 percent tariff was used as the domestic price paid by livestock farmers. The results of the analysis are given in Table 11.

For comparison purposes, the average of each NPR_D, NPR_T and ERP were calculated in Table 12 for three different subperiods. The table shows that the real protection rate (NPR_T) was substantially lower than the nominal protection rate (NPR_D) for all products throughout the entire period, and that NPR_T was negative for all products during 1962-69. This is because the implicit overvaluation of the won more than offset the nominal protection given to the five agricultural products. The average over-valuation rate of foreign exchange in nominal terms during the 1960s was as high as 100 percent and thereafter declined to 18 percent during 1970-79 and 15 percent during 1980-84.

If the distorted agricultural input prices are taken into account, one would expect some degree of discrepancy between NPR_T and ERP. Contrary to one's expectation, however, the estimated effective

rates of protection (ERP) for rice, barley, and soybeans, do not differ significantly from the real protection rates (NPR_T). This is because fertilizer price distortion was not large enough to alter the EPRs, due to its negligible share of the total value of production. For instance, fertilizer cost constitutes only 4-5 percent of the producer price of rice. In the case of beef and pork, however, the estimated ERPs are higher than the NPR_T. This implies that livestock farmers largely benefited by using feedmix containing cheaper imported corn.

Overall, trade and exchange rate policies exerted a squeeze on agriculture in the 1960s, while the price effects of agricultural pricing and trade policies since the early 1970s indicate growing protection.

Table 11. Effects of Interventions on Relative Values Added[a/]

	ERP (Rice/NA)	ERP (Barley/NA)	ERP (Soybean/NA)	ERP (Beef/NA)	ERP (Pork/NA)
	(1)	(2)	(3)	(4)	(5)
1962	-.288	-.268	-.279	-.239	.323
1963	.014	.223	.077	-.274	.158
1964	-.218	.064	.028	-.431	-.130
1965	-.332	-.042	-.009	-.229	.046
1966	-.352	-.501	.001	-.290	-.162
1967	-.383	-.441	.329	-.130	.100
1968	-.297	-.267	-.116	.041	.533
1969	-.224	-.112	.093	-.026	.068
1970	-.169	-.266	.471	-.000	.355
1971	.163	.137	.077	-.002	.454
1972	.573	.463	.388	.159	.149
1973	-.062	-.048	.029	-.052	.348
1974	-.261	-.292	-.070	-.048	-.100
1975	-.167	-.287	.046	.014	.154
1976	.664	.051	.541	.554	.326
1977	1.106	.799	.695	.884	.233
1978	.688	1.042	1.189	1.626	.101
1979	1.338	1.108	.362	.833	-.145
1980	..926	.660	1.330	.418	-.008
1981	.816	.567	1.833	.877	-.053
1982	.799	1.203	2.246	1.419	-.168
1983	.626	1.361	2.356	1.368	.069
1984	.520	.724	2.074	1.515	-.022

Source: Ministry of Agriculture and Fisheries, Cost of Production Survey, various issues.

National Agricultural Cooperative Federation, Rural Price and Wage Survey, various issues.

FAO, Trade Yearbook, various issues.

[a/] $ERP = \frac{VA - VA^*}{VA^*}$

where VA = Actual unit value added

VA^* = Unit value added in the absence of direct and indirect price interventions

and

$$VA = P_A - \sum_j a_{Aj} P_j$$

$$VA^* = P_A^* - \sum_j a_{Aj} P_j$$

P_A = Actual producer price of output A

P_A^* = Border price of output A evaluated at equilibrium exchange rate E*

P_j = Price of purchased input j paid by farmers

P_j^* = Border price of purchased input j evaluated at equilibrium exchange rate E*

a_{Aj} = Input coefficient

Table 12. Summary of Price Intervention Effects for Selected Sub-periods

Period	Rice	Barley	Soybean	Beef	Pork
	(1)	(2)	(3)	(4)	(5)
		(NPR_D)			
1962-69	.135	.257	.521	.110	.395
1970-79	.765	.606	.755	.731	.467
1980-84	.995	1.175	2.381	1.383	.111
		(NPR_T)			
1962-69	(-).269	(-).191	(-).009	(-).274	(-).091
1970-79	.383	.260	.365	.363	.121
1980-84	.739	.914	1.982	1.105	(-).053
		(ERP)			
1962-69	(-).260	(-).168	.016	(-).197	.117
1970-79	.387	.270	.372	.397	.186
1980-84	.737	.903	1.968	1.119	(-).036

Source: Calculated from Table 8-2, Table 10-2 and Table 11.

Chapter 4

EFFECTS OF PRICE INTERVENTION

The Effect on Agricultural Output

Given the elasticity of supply of each product with respect to relative prices, one can estimate the effect of government intervention on the output of each product in the short run and long run. To measure supply elasticity, the Nerlovian lagged supply function was fitted to the observed data. The Nerlovian supply function hypothesizes that the output response of a given crop to a price change depends on the prices of corresponding outputs and the prices of inputs used, as well as on output in the previous year. Specifically, it takes the form:

$$Q_{x,\,t} = a + \alpha\,(b \ln P_{x,\,t-1} + c \ln P_{z,\,t-1}) + (1 - \alpha) \ln Q_{x,\,t-1}$$

where: $Q_{x,t}$ = Current output

$Q_{x,\,t-1}$ = Output in the previous year

$P_{x,\,t-1}$ = Product price in the previous year

$P_{z,\,t-1}$ = Major input price in the previous year

αb (αc) = Short-run supply elasticity w/r to own price (input price)

α = Adjustment coefficient of the current output to product and input prices.

The above supply function precludes substitutability among different crops, assuming that the farm producer's response to price is influenced neither by the price of other crops nor by the inputs used for other crops. The factors which condition farmer decisionmaking in Korea are many and complicated. Three of the major factors are:

1. Limits on the elasticity of substitution among crops. For example, rice is grown in paddy land where irrigation is required, while barley and soybeans are primarily grown upland (on dry land). Sometimes, however, they are planted in paddy land as a second crop after rice. Substitution between cattle-raising and swine production is also limited. Beef cattle are mostly raised by farmers in small herds of 2 to 5 animals, whereas a significant portion of hog production comes from large-scale farms.
2. A certain degree of labor competition between rice transplanting and barley harvest for a short period. This is not so strong as to preclude the planting of either one or two crops, once it is planned to grow both. Moreover, a traditional labor exchange system alleviates labor shortages during the period of peak demand.
3. Diversified use of fertilizer is limited because a specific kind is generally used for a specific crop; in the case of compound fertilizer, the government sells only those already prepared.

In estimating the supply function for each product, the data were adjusted to three year moving averages. The use of moving average price and moving average output during the preceding three years was based on the judgment that farmers are trend-conscious.[3/] Output data were based on the aggregate production statistics presented in Appendix Table 16c. All the price data were deflated by non-agricultural CPI (P_{NA}). As for the input price data, only the price of fertilizer was used for the three crops. In the cases of beef and pork the price of corn was used. The estimated supply equations are:[4/]

Rice:

$$\ln Q_t = \underset{(4.104)}{4.038} + \underset{(3.707)}{.277}\ln P_{t-1} + \underset{(1.239)}{.467}\ln Q_{t-1} + \underset{(3.590)}{.048}\ln P_{Ft-1} \qquad R^2 = .944$$

3/ Conventionally, the price of the immediately previous harvest season has been used in estimating supply function under the assumption that farmers expect to receive the same price for the current output. This assumption is valid only if the previous season price has been a fairly stable one. But where a fluctuation in aggregate production causes a corresponding fluctuation in price, it is hard to believe that farmers expect to receive the abnormally high or low price for their products. The use of three-year average here is rather arbitrary, and each year's price is equally weighted.

4/ An attempt was made to estimate the output supply elasticities and cross-elasticities using multi-products variable profit function and deriving therefrom a set of supply functions and input demand functions. But since the estimated results were not satisfactory, they were not used in this study. Appendix Table 36 gives the estimated results, and Appendix Table 37 provides a list of supply elasticities for agricultural products estimated by other researchers (and by one of the present authors).

Barley:

$$\ln Q_t = \underset{(.278)}{-.321} + \underset{(2.411)}{.488}\ln P_{t-1} + \underset{(4.382)}{.721}\ln Q_{t-1} - \underset{(1.047)}{.118}\ln P_{Ft-1}$$

$R^2 = .867$

Soybeans:

$$\ln Q_t = \underset{(.095)}{.089} + \underset{(1.282)}{.303}\ln P_{t-1} + \underset{(5.624)}{.727}\ln Q_{t-1} - \underset{(1.863)}{.091}\ln P_{Ft-1}$$

$R^2 = .941$

Beef:

$$\ln Q_t = \underset{(4.577)}{.691} + \underset{(2.680)}{.251}\ln P_{t-1} + \underset{(6.090)}{.615}\ln Q_{t-1} + \underset{(3.326)}{.256}\ln P_{Ft-1}$$

$R^2 = .965$

Pork:

$$\ln Q_t = \underset{(2.692)}{-.394} + \underset{(4.497)}{.688}\ln P_{t-1} + \underset{(6.099)}{.614}\ln Q_{t-1} - \underset{(1.574)}{.196}\ln P_{Ft-1}$$

$R^2 = .991$

* Figures in parenthesis are t-values.

The following table gives the short- and long-run supply elasticities derived from the above equations:

Product (Q)	Short-run Elasticity (αb)	Long-run Elasticity (b)	Elasticity w/r to Input Price (αc)
Rice	.277	.520	.048 a/
Barley	.488	1.749	-.118
Soybean	.303	1.110	-.091
Beef	.256	.665	.256 a/
Pork	.668	1.731	-.196

a/ Not used in simulation of output effect due to wrong sign.

The estimated elasticities for barley and soybeans are higher than rice, indicating a faster response to price changes. The results also show that livestock producers are more responsive to changes in pork prices than to changes in beef prices. This is ascribable to the fact that the investment period is in general longer for cattle than for swine.

Applying the above estimated elasticity coefficients, both the direct and total effects of price intervention on aggregate output were measured for the five products. In measuring the direct output effect in both the short and the long run, the price changes (NPR_D) were calculated as:

$$NPR_D = \frac{P_X/P_{NA} - P_X'/P_{NA}}{P_X'/P_{NA}}$$

where NPR_D = Nominal protection rate on P_x due to direct effect of intervention

P_X' = Border price (adjusted for transport cost, quality, etc.) at the official exchange rate

In measuring the total short-run output effect, the price changes in the preceding period ($\Delta P^{SR}_{X,\ t-1}$) caused by the elimination of all intervention (direct and indirect) were applied. ΔP^{SR}_X is estimated by:

$$\Delta P_X^{SR} = NPR^{SR} = \frac{P_X/P_{NA} - \frac{E^*}{E_o} P_X'/P_{NA}}{\frac{E^*}{E_o} P_X'/P_{NA}}$$

$$= \frac{P_X - \frac{E^*}{E_o} P'_X}{\frac{E^*}{E_o} P_X'}$$

where NPR^{SR} = Nominal protection rate on P_X due to total effect of intervention

In estimating the total long-run effect, the cumulative effects of past price changes were taken into account instead of applying the estimated long-run elasticity (b). The sum of effects of past price changes on current output (X_t) is measured by:

$$\Delta X_t = \alpha\, b\, \Delta P_{X,\, t-1} + (1 - \alpha)\, b\, \Delta P_{X,\, t-2}$$

(short-run) effect in t — (long-run) effect in t

ΔP_X is given by:

$$\Delta P_X = NPR_T = \frac{P_X/P_{NA} - \frac{E^*}{E_o} P_X'/P_{NA}^*}{\frac{E^*}{E_o} P_X'/P_{NA}^*}$$

where $P^{*}_{NA} = \beta \frac{E^{*}}{E_o} \frac{P_{NAT}}{1 + t_{NA}} + (1-\beta) P_{NAH}, t_{NA}$

is the effect of trade taxes on P_{NAT}, and

NPR_T = Nominal protection rate due to total effect of intervention

Three-year moving averages of the above estimated NPR_D, NPR^{SR}, and NPR_T were used in measuring both direct and total output effects, given the volatility of world prices (see Appendix Table 39c). Tables 13a and 13b present the direct short-run and long-run effects, and Tables 13c and 13d the total short-run and long-run effects on agricultural outputs, respectively.5/

According to Table 13a, pricing policy had a direct, positive, short-run effect on all five products throughout 1962-84, except for barley and beef for a few years in the 1960s, and the magnitudes consistently increased over the period. During 1962-69 the average direct short-run output effects were 6 percent for rice, 15 percent for barley, 14 percent for soybeans, and 2 percent for beef. With nominal protection being intensified over time, the output effects rose to 26

5/ In interpreting the empirical results, based on the past observations, one must not overlook the fact that, even if the fitted function is accurate and the estimated coefficients are statistically significant, they can only serve as an indicator in the neighborhood of the statistical population to which they refer. Specifically, the estimated elasticity may not predict what the output response would be if the relative price of a product should double or fall by as much as 50 percent, since price changes of such magnitude have never been experienced by Korean farmers and are very unlikely to occur in the future.

percent for rice, 60 percent for barley, 61 percent for soybeans and 35 percent for beef during 1980-84. In the case of pork, the output effect shows a somewhat different pattern over time: an average 18 percent increase in pork output during 1962-69, 31 percent during 1970-79, and only 5 percent for the 1980-84 period.

Table 13b shows that the cumulative effects are substantially greater than the short-run effects for every year. To take the 1980-84 period as an illustration, direct intervention resulted in an average 63 percent increase in rice output, 168 percent increase in barley output, 155 percent increase in soybean output, 82 percent increase in beef output, and 52 percent increase in pork output.

But when both the direct and indirect effects of intervention are combined (i.e., taking into account the overvaluation of exchange rate), the effects on output are estimated as negative for all products throughout the 1960s, and for the remaining years substantially reduced. According to Table 13c, total intervention in the period 1962-69 resulted in an average decrease in rice production of about 11 percent, along with a 12 percent decrease in barley production, a 4 percent decrease in soybean production, an 11 percent decrease in beef production, and a 14 percent decrease in pork production. In other words, the effect of exchange rate overvaluation more than offset the effect of direct intervention in price during the 1960s. Although exchange rate overvaluation persisted throughout the remaining period, it did not offset the effect of direct intervention and thus resulted in a positive effect on output. During 1980-84 the total short-run effect

on output was, on average, 23 percent for rice, 43 percent for barley, 49 percent for soybeans, and 25 percent for beef. Notable is the negative effect of (-)5 percent on pork production.

The total cumulative effect on output is measured in Table 13d. According to the estimated results, the total cumulative effect during 1980-84 was to increase rice production by 45 percent, barley production by 110 percent, soybean production by 117 percent, and beef production by 60 percent over what they would have been in the absence of price intervention.

The Effect on Consumption

Ideally, the effects of price intervention would best be analyzed by incorporating into one system all the decisions that govern resource allocation in production, sales, and consumption.[6/] However, there is usually a divergence between production decisions (or plans) and actual production, due to uncontrollable factors. This fact alone gives a sufficient reason, from the analytical point of view, to separate our analysis of consumption from production and to carry out an analysis of consumer response with realized output as a starting point.

6/ The necessity of simultaneous consideration of related variables is stressed by Girschick and Haavelmo: "... it is impossible to derive statistically the demand functions from market data without specification of the supply functions involved. More generally, if we wish to estimate any particular economic relationship on the basis of market data we are forced to consider, simultaneously, the whole system of economic relations that together represent the mechanism that produces the data we observe in the market" (Girschick and Haavelmo, 1947).

Table 13a. Direct Short-Run Output Effect[a/]

Unit: 1,000 MT

Year	Rice			Barley			Soybean			Beef			Pork		
	Q_R	Q_R'	$\Delta Q_R'/Q_R'$	Q_B	Q_B'	$\Delta Q_B'/Q_B'$	Q_S	Q_S'	$\Delta Q_S'/Q_S'$	Q_{BF}	Q_{BF}'	$\Delta Q_{BF}'/Q_{BF}'$	Q_{PK}	Q_{PK}'	$\Delta Q_{PK}'/Q_{PK}'$
1960	3,047	-	-	1,098	-	-	130	-	-	13	-	-	58	-	-
61	3,463	-	-	1,110	-	-	165	-	-	13	-	-	60	-	-
62	3,015	2,699	.12	1,113	830	.34	156	136	.15	17	16	.07	58	49	.17
63	3,758	3,370	.12	746	555	.34	156	147	.06	21	21	.01	55	48	.15
64	3,954	3,578	.11	1,227	990	.24	163	148	.11	32	32	-.01	63	54	.17
65	3,501	3,230	.08	1,459	1,135	.29	174	152	.15	27	27	-.01	56	49	.14
66	3,919	3,911	.00	1,632	1,513	.08	161	144	.12	29	30	-.02	96	92	.05
67	3,603	3,617	-.00	1,550	1,630	-.05	201	173	.16	32	32	.01	72	64	.12
68	3,195	3,167	.00	1,680	1,812	-.07	245	210	.17	36	34	.05	62	48	.28
69	4,090	3,979	.03	1,666	1,617	.03	229	193	.19	33	30	.09	77	57	.35
70	3,939	3,795	.04	1,591	1,500	.06	232	194	.20	37	34	.10	83	58	.43
71	3,997	3,637	.10	1,510	1,311	.15	222	182	.22	40	36	.10	90	64	.42
72	3,957	3,334	.19	1,600	1,272	.26	224	179	.25	40	36	.11	94	66	.44
73	4,212	3,551	.19	1,443	1,138	.27	246	208	.18	45	41	.10	92	65	.42
74	4,445	3,969	.12	1,388	1,171	.19	319	277	.15	52	48	.08	95	76	.25
75	4,669	4,512	.03	1,700	1,683	.01	311	285	.09	70	66	.07	107	86	.25
76	5,215	4,719	.11	1,759	1,793	-.02	295	264	.12	75	67	.12	118	96	.23
77	6,006	4,840	.24	814	707	.15	319	271	.18	77	64	.20	151	117	.30
78	5,797	4,395	.32	1,348	974	.38	293	227	.29	74	55	.34	172	137	.25
79	5,565	3,984	.40	1,508	927	.63	257	198	.30	87	63	.37	223	198	.13
80	3,550	2,561	.39	811	491	.65	216	153	.41	93	70	.34	235	220	.07
81	5,063	3,609	.40	859	553	.55	257	173	.48	69	54	.27	209	202	.04
82	5,175	3,903	.33	749	491	.53	233	139	.67	62	47	.31	238	226	.05
83	5,404	4,245	.27	815	510	.60	226	130	.74	66	48	.38	295	280	.05
84	5,683	4,624	.23	804	504	.60	253	146	.74	91	64	.43	341	325	.05

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues.

a/ Calculation based on the estimated short-run supply elasticities and the estimated 3-year moving averages of direct nominal protection rates (for producers) presented in Table 8-2.

Q_i = Actual output

Q_i' = Output in the absence of short-run direct price interventions

$$\frac{\Delta Q_i'}{Q_i'} = \frac{Q_i - Q_i'}{Q_i'}$$

Figure 6

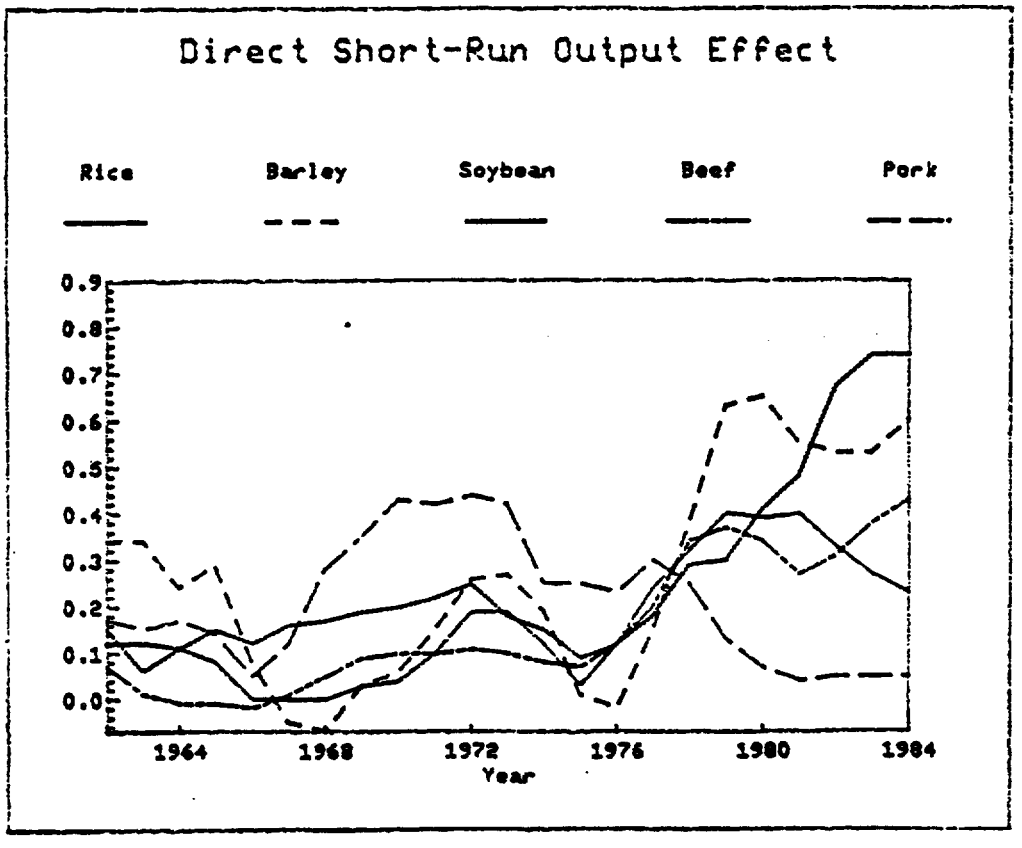

Direct Short-Run Output Effect
Rice
Barley
Soybean
Beef
Pork
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1964
1968
1972
1976
1980
1984
Year

Table 13b. Direct Long-Run (Cumulative) Output Effect [a/]

Unit: 1,000 MT

Year	Rice			Barley			Soybean			Beef			Pork		
	Q_R	Q'_R	$\Delta Q'_R/Q'_R$	Q_B	Q'_B	$\Delta Q'_B/Q'_B$	Q_S	Q'_S	$\Delta Q'_S/Q'_S$	Q_{BF}	Q'_{BF}	$\Delta Q'_{BF}/Q'_{BF}$	Q_{PK}	Q'_{PK}	$\Delta Q'_{PK}/Q'_{PK}$
1960	3,047	-	-	1,098	-	-	130	-	-	13	-	-	58	-	-
61	3,463	-	-	1,110	-	-	165	-	-	13	-	-	60	-	-
62	3,015	2,699	.12	1,113	830	.34	156	136	.15	17	16	.07	58	49	.17
63	3,758	3,212	.17	746	470	.59	156	133	.17	21	20	.05	55	44	.25
64	3,954	3,337	.19	1,227	737	.66	163	133	.23	32	31	.03	63	48	.33
65	3,501	2,992	.17	1,459	827	.77	174	133	.31	27	27	.00	56	42	.34
66	3,919	3,622	.08	1,632	1,001	.63	161	120	.35	29	30	-.02	96	77	.25
67	3,603	3,485	.03	1,550	1,103	.41	201	142	.41	32	32	-.00	72	56	.28
68	3,195	3,117	.03	1,680	1,378	.22	245	167	.46	36	34	.05	62	43	.45
69	4,090	3,933	.04	1,666	1,402	.19	229	150	.53	33	29	.12	77	47	.63
70	3,939	3,730	.06	1,591	1,329	.20	232	147	.58	37	31	.18	83	46	.81
71	3,997	3,550	.13	1,510	1,167	.29	222	135	.64	40	33	.20	90	47	.92
72	3,957	3,176	.25	1,600	1,088	.47	224	130	.72	40	32	.24	94	47	1.00
73	4,212	3,240	.30	1,443	898	.61	246	144	.70	45	36	.24	92	45	1.03
74	4,445	3,528	.26	1,388	855	.62	319	192	.66	52	42	.23	95	50	.89
75	4,669	4,060	.15	1,700	1,165	.46	311	198	.57	70	58	.21	107	60	.79
76	5,215	4,438	.18	1,759	1,341	.31	295	192	.53	75	60	.25	118	69	.71
77	6,006	4,540	.32	814	591	.38	319	204	.56	77	57	.36	151	87	.73
78	5,797	3,946	.47	1,348	814	.66	293	172	.70	74	47	.56	172	101	.70
79	5,565	3,444	.62	1,508	718	1.10	257	142	.80	87	51	.72	223	143	.56
80	3,550	2,122	.67	811	332	1.45	216	108	1.00	93	52	.78	235	166	.41
81	5,063	2,949	.72	859	331	1.59	257	116	1.21	69	39	.75	209	162	.29
82	5,175	3,116	.66	749	280	1.67	233	91	1.55	62	35	.77	238	193	.23
83	5,404	3,416	.58	815	291	1.80	226	79	1.87	66	36	.86	295	246	.20
84	5,683	3,786	.50	804	278	1.90	253	82	2.10	91	47	.95	341	292	.17

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues.

a/ Calculation based on the estimated cumulative supply elasticities and the estimated 3-year moving averages of direct nominal protection rates (for producers) presented in Table 8-2.

Q_i = Actual output

Q'_i = Output in the absence of direct price interventions

$$\frac{\Delta Q'_i}{Q'_i} = \frac{Q_i - Q'_i}{Q'_i}$$

Figure 7

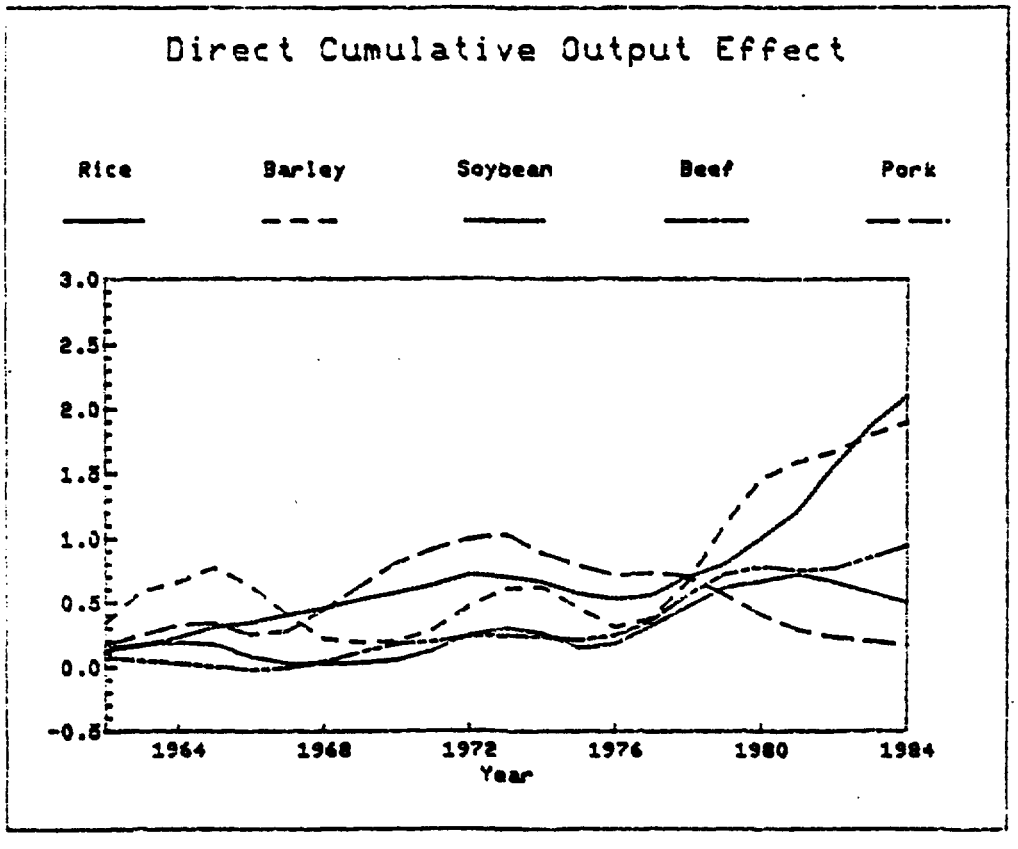

Direct Cumulative Output Effect
Rice
Barley
Soybean
Beef
Pork
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
1964
1968
1972
1976
1980
1984
Year

Table 13c. Total Short-Run Output Effect [a/]

Unit: 1,000 MT

Year	Rice			Barley			Soybean			Beef			Pork		
	Q_R	Q_R^*	$\Delta Q_R^*/Q_R^*$	Q_B	Q_B^*	$\Delta Q_B^*/Q_B^*$	Q_S	Q_S^*	$\Delta Q_S^*/Q_S^*$	Q_{BF}	Q_{BF}^*	$\Delta Q_{BF}^*/Q_{BF}^*$	Q_{PK}	Q_{PK}^*	$\Delta Q_{PK}^*/Q_{PK}^*$
1960	3,047	-	-	1,098	-	-	130	-	-	13	-	-	58	-	-
61	3,463	-	-	1,110	-	-	165	-	-	13	-	-	60	-	-
62	3,015	3,395	-.11	1,113	1,190	-.07	156	167	-.07	17	19	-.12	58	73	-.21
63	3,758	4,218	-.11	746	791	-.06	156	172	-.10	21	24	-.14	55	69	-.21
64	3,954	4,443	-.11	1,227	1,365	-.10	168	175	-.07	32	38	-.15	63	78	-.19
65	3,501	3,912	-.11	1,459	1,539	-.05	174	160	-.04	27	31	-.13	56	68	-.17
66	3,919	4,443	-.12	1,632	1,850	-.12	161	165	-.02	29	33	-.12	96	116	-.17
67	3,603	4,113	-.12	1,550	1,879	-.18	201	205	-.02	32	35	-.09	72	81	-.11
68	3,195	3,631	-.12	1,680	2,087	-.20	245	250	-.02	36	39	-.07	62	64	-.03
69	4,090	4,590	-.11	1,666	1,926	-.14	229	231	-.01	33	35	-.06	77	76	.01
70	3,939	4,333	-.09	1,591	1,800	-.12	232	225	.03	37	39	-.05	83	78	.06
71	3,997	4,212	-.05	1,510	1,601	-.06	222	211	.05	40	42	-.04	90	85	.06
72	3,957	3,849	.03	1,600	1,533	.04	224	206	.09	40	41	-.02	94	85	.11
73	4,212	4,027	.05	1,443	1,402	.03	246	243	.01	45	45	-.01	92	77	.20
74	4,445	4,379	.02	1,388	1,335	.04	319	302	.06	52	52	-.01	95	89	.07
75	4,669	4,930	-.05	1,700	1,866	-.09	311	308	.01	70	71	-.02	107	101	.06
76	5,215	5,113	02	1,759	1,963	-.10	295	284	.04	75	72	.04	118	111	.06
77	6,006	5,187	.16	814	761	.07	319	288	.11	77	68	.13	151	131	.16
78	5,797	4,579	.27	1,348	1,047	.29	293	239	.23	74	58	.27	172	149	.16
79	5,565	4,238	.31	1,508	1,027	.47	257	211	.22	87	68	.28	223	214	.04
80	3,550	2,776	.28	811	563	.44	216	168	.28	93	76	.23	235	243	-.03
81	5,063	4,006	.26	859	630	.36	257	191	.35	69	59	.16	209	224	-.07
82	5,175	4,235	.22	749	545	.37	233	153	.53	62	51	.22	238	255	-.07
83	5,404	4,488	.20	815	550	.48	226	139	.63	66	51	.30	295	308	-.04
84	5,683	4,816	.18	804	535	.50	253	153	.65	91	67	.36	341	352	-.03

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues.

a/ Calculation based on the estimated short-run supply elasticities and the estimated 3-year moving averages of short-run total nominal protection rates (for producers) presented in Appendix 39a and 39b.

Q_i = Actual output

Q_i^* = Output in the absence of short-run direct and indirect price interventions

$$\frac{\Delta Q_i^*}{Q_i^*} = \frac{Q_i - Q_i^*}{Q_i^*}$$

Figure 8

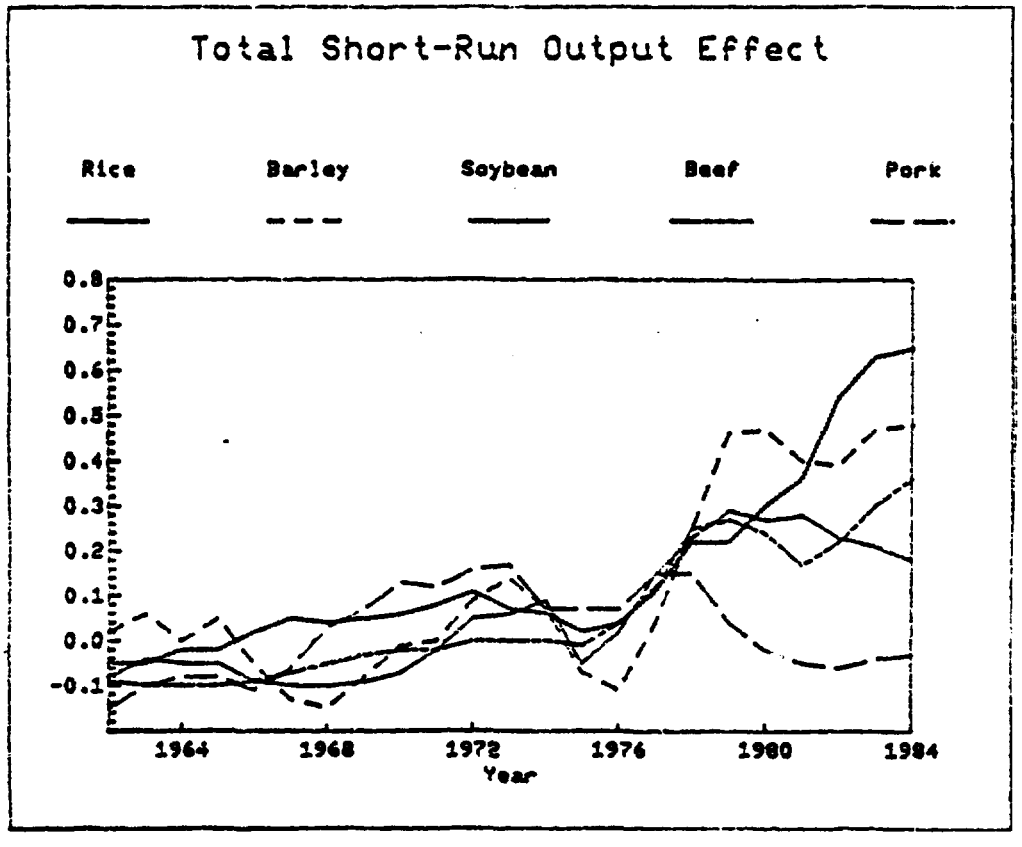

Total Short-Run Output Effect
Rice
Barley
Soybean
Beef
Pork
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
1964
1968
1972
1976
1980
1984
Year

Table 13d. Total Long-Run (Cumulative) Output Effect [a/]

Unit: 1,000 MT

Year	Rice			Barley			Soybean			Beef			Pork		
	Q_R	Q_R^*	$\Delta Q_R^*/Q_R^*$	Q_B	Q_B^*	$\Delta Q_B^*/Q_B^*$	Q_S	Q_S^*	$\Delta Q_S^*/Q_S^*$	Q_{BF}	Q_{BF}^*	$\Delta Q_{BF}^*/Q_{BF}^*$	Q_{PK}	Q_{PK}^*	$\Delta Q_{PK}^*/Q_{PK}^*$
1960	3,047	-	-	1,098	-	-	130	-	-	13	-	-	58	-	-
61	3,463	-	-	1,110	-	-	165	-	-	13	-	-	60	-	-
62	3,015	3,267	-.08	1,113	1,109	.00	156	164	-.05	17	19	-.09	58	68	-.15
63	3,758	4,080	-.08	746	702	.06	156	170	-.08	21	25	-.16	55	68	-.19
64	3,954	4,317	-.08	1,227	1,176	.04	163	177	-.08	32	40	-.20	63	79	-.20
65	3,501	3,847	-.09	1,459	1,357	.08	174	182	-.04	27	35	-.22	56	71	-.21
66	3,919	4,489	-.13	1,632	1,645	-.01	161	163	-.02	29	38	-.23	96	126	-.24
67	3,603	4,289	-.16	1,550	1,824	-.15	201	194	.03	32	41	-.21	72	91	-.21
68	3,195	3,868	-.17	1,680	2,333	-.28	245	230	.07	36	44	-.18	62	69	-.10
69	4,090	4,922	-.17	1,666	2,404	-.31	229	208	.10	33	38	-.14	77	76	.01
70	3,939	4,612	-.15	1,591	2,289	-.31	232	204	.14	37	41	-.11	83	73	.14
71	3,997	4,402	-.09	1,510	1,987	-.24	222	188	.18	40	44	-.08	90	75	.21
72	3,957	3,933	.01	1,600	1,782	-.10	224	180	.24	40	42	-.05	94	73	.28
73	4,212	3,974	.06	1,443	1,389	.04	246	197	.25	45	46	-.03	92	68	.35
74	4,445	4,245	.05	1,388	1,294	.07	319	257	.24	52	53	-.02	95	74	.28
75	4,669	4,794	-.03	1,700	1,754	-.03	311	261	.19	70	72	-.03	107	86	.24
76	5,215	5,163	.01	1,759	2,001	-.12	295	250	.18	75	74	.02	118	97	.22
77	6,006	5,200	.16	814	836	-.03	319	258	.24	77	68	.13	151	117	.29
78	5,797	4,449	.30	1,348	1,072	.26	293	211	.39	74	55	.34	172	130	.32
79	5,565	3,886	.43	1,508	910	.66	257	171	.50	87	59	.49	223	180	.24
80	3,550	2,410	.47	811	419	.94	216	130	.66	93	60	.54	235	209	.13
81	5,063	3,369	.50	859	417	1.06	257	139	.84	69	46	.51	209	204	.02
82	5,175	3,525	.47	749	347	1.16	233	108	1.16	62	40	.54	238	249	-.04
83	5,404	3,787	.43	815	351	1.32	226	91	1.48	66	40	.64	295	315	-.06
84	5,683	4,112	.38	804	327	1.46	253	93	1.73	91	52	.76	341	365	-.07

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues.

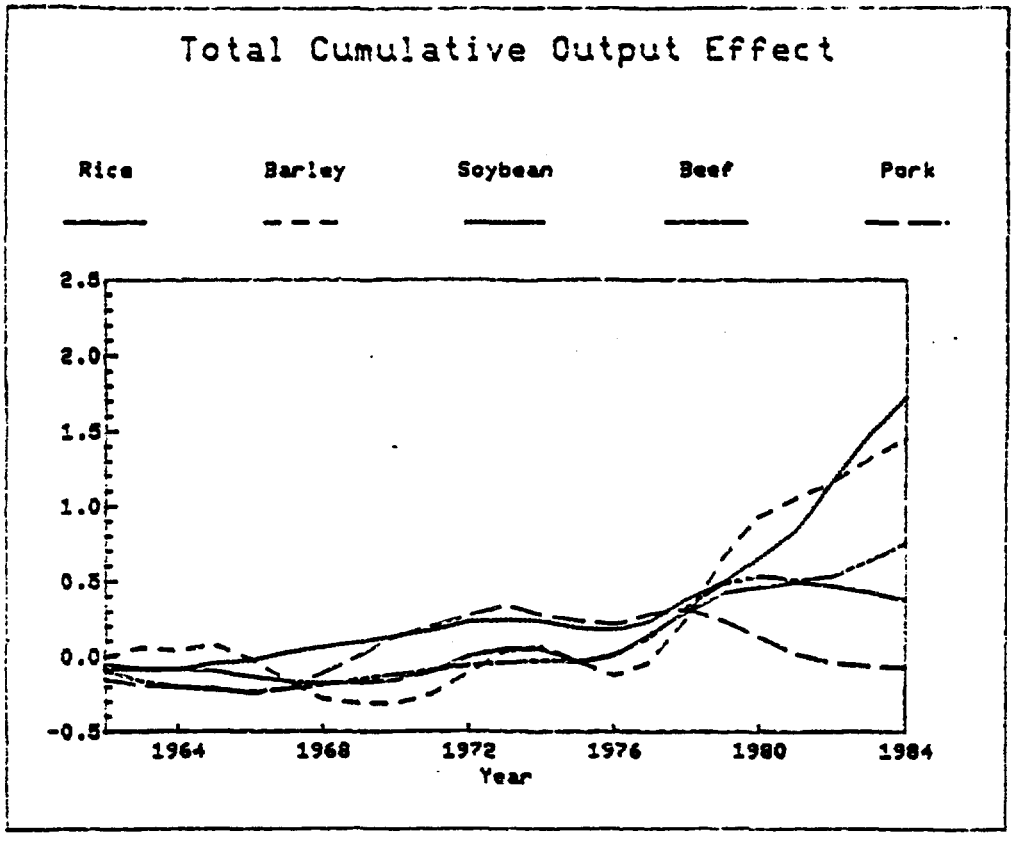
a/ Calculation based on the estimated cumulative supply elasticities and the estimated 3-year moving averages of total nominal protection rates (for producers) presented in Table 10-2.

Q_i = Actual output

Q_i^* = Output in the absence of direct and indirect price interventions

$$\frac{\Delta Q_i^*}{Q_i^*} = \frac{Q_i - Q_i^*}{Q_i^*}$$

Figure 9


Total Cumulative Output Effect
Rice
Barley
Soybean
Beef
Pork
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
1964
1968
1972
1976
1980
1984
Year

The present subsection attempts first to estimate the degree of consumer response to price changes in terms of price elasticities for the five agricultural products, and then to measure the effect on aggregate consumption, using the estimated elasticities of price intervention. The ordinary theory of demand hypothesizes that the demand for a commodity is a function of the price of the commodity, the price of related goods, and the disposable income of the consumer.

Two different types of demand functions were fitted: a linear single equation model for rice, barley, and pork, and a log-linear model for soybeans and beef. In estimating the demand functions for rice and barley, it was hypothesized that consumers at different levels of income respond differently to a given change in price. In order to reflect such an inference about consumer preference, an interaction term between price and income was introduced into the model. It is also to be noted that various rice-saving measures executed by the government during the 1960s through the late 1970s were to some extent responsible for reducing rice consumption and increasing barley consumption, irrespective of price. For instance, restaurants were required to serve a mixture of 75 percent rice and 25 percent barley. They were also required to serve flour-noodles and other non-rice cereals on Wednesdays and Saturdays. Lunches carried by school children had to contain a similar mixture. These non-quantifiable administrative effects are taken into account by introducing a dummy variable in the model for the respective periods. For the consumption variable, the weighted average of rural and urban per capita consumption data were used for all

products, so that separate estimations are not needed for rural and urban consumers. Price and income data were deflated by CPI. The following are the estimated demand equations for each product:7/

Rice:

$$Q_R = \underset{(10.925)}{375.28} - \underset{(11.014)}{.443}\, P_R + \underset{(4.260)}{.106}\, P_B - \underset{(4.589)}{.0089}\, P_W - \underset{(3.152)}{.282}\, Y + \underset{(4.984)}{.000821}\, P_R Y - \underset{(2.965)}{9.318}\, D \qquad R^2 = .825$$

Barley:

$$Q_B = \underset{(9.704)}{49.53} + \underset{(2.728)}{.046}\, P_R - \underset{(2.662)}{.0846}\, P_B - \underset{(2.569)}{.0425}\, Y + \underset{(1.407)}{.0730}\, P_B Y + \underset{(3.169)}{6.419}\, D \qquad R^2 = .905$$

Soybeans:

$$\ln Q_S = \underset{(2.329)}{1.36} - \underset{(2.084)}{.253}\, \ln P_S + \underset{(12.500)}{.458}\, \ln Y + \underset{(7.931)}{.894}\, (1/Y) \qquad R^2 = .968$$

Beef:

$$\ln Q_{BF} = \underset{(.445)}{.613} - \underset{(4.050)}{.798}\, \ln P_{BF} + \underset{(3.588)}{.552}\, \ln P_{PK} + \underset{(7.928)}{.416}\, \ln Y \qquad R^2 = .964$$

Pork:

$$Q_{PK} = \underset{(7.742)}{2.586} + \underset{(.688)}{.00016}\, P_{BF} - \underset{(1.676)}{.000537}\, P_{PK} + \underset{(8.379)}{.00360}\, Y \qquad R^2 = .948$$

7/ Consumption elasticities estimated by other researchers are presented in Appendix Table 38.

where:

Q_R = Annual per capita consumption of rice (in kilos)

Q_B = Annual per capita consumption of barley (in kilos)

Q_S = Annual per capita consumption of soybeans (in kilos)

Q_{BF} = Annual per capita consumption of beef (in kilos)

Q_{PK} = Annual per capita consumption of pork (in kilos)

P_R = Consumer price of rice per kilo deflated by non-agricultural CPI (P_{NA})

P_B = Consumer price of barley per kilo deflated by non-agricultural CPI (P_{NA})

P_S = Consumer price of soybeans per kilo deflated by non-agricultural CPI (P_{NA})

P_W = Consumer price of wheat per kilo deflated by nonagricultural CPI (P_{NA})

P_{BF} = Consumer price of beef per kilo deflated by non-agricultural CPI (P_{NA})

P_{PK} = Consumer price of pork per kilo deflated by non-agricultural CPI (P_{NA})

Y = Per capita GNP deflated by CPI

D = 1, if 1961-77

= 0, otherwise

* Figures in parenthesis are t-values.

The own-price elasticities, cross-elasticities, and income-elasticities derived from the above estimated demand equations are summarized in the following table:

Product	Estimated Elasticities with Respect to					
	Rice Price (P_R)	Barley Price (P_B)	Soybean Price (P_S)	Beef Price (P_{BF})	Pork Price (P_{PK})	Income (Y)
Rice (Q_R)	-.343	.185				.203
Barley (Q_B)	.454	-.301				-.243
Soybeans (Q_S)			-.253			.436
Beef (Q_{BF})				-.798	.552	.416
Pork (Q_{PK})				.155	-.278	.406

Note: Elasticities for rice, barley, and pork are mean elasticities.

Combining the above-estimated elasticities with the difference between actual prices and the non-intervention consumer prices NPR_D^C and NPR_T^C, the magnitude of direct intervention on aggregate consumption of each product (see Table 13e) and total intervention (see Table 13f) was measured.

The effect of direct intervention in prices was to reduce consumption of rice, soybeans, and beef in nearly all years of the 1962-84 period, while reducing pork consumption until 1976 but increasing it after 1977. Total intervention, however, resulted in quite a different pattern of consumption. In earlier years, when exchange rate overvaluation was relatively high, total intervention contributed to increasing rice and soybean consumption, but as the overvaluation rate

Table 13e. Direct Consumption Effect [a/]

Unit: 1,000 MT

Year	Rice			Barley			Soybean			Beef			Pork		
	D_R	D'_R	$\Delta D'_R/D'_R$	D_B	D_B	$\Delta D'_B/D'_B$	D_S	D'_S	$\Delta D'_S/D'_S$	D_{BF}	D'_{BF}	$\Delta D'_{BF}/D'_{BF}$	D_{PK}	D'_{PK}	$\Delta D'_{PK}/D'_{PK}$
1960	3,126	-	-	995	-	-	174	-	-	13	-	-	58	-	-
61	3,092	-	-	1,230	-	-	148	-	-	13	-	-	60	-	-
62	3,407	3,487	-.02	1,235	1,219	.01	185	194	-.05	17	20	-.18	38	38	-.00
63	3,136	3,240	-.03	1,166	1,131	.03	166	179	-.07	21	24	-.13	55	56	-.01
64	3,709	3,754	-.01	1,017	1,012	.01	165	180	-.08	32	34	-.05	63	65	-.03
65	3,925	3,878	.01	1,377	1,394	-.01	163	173	-.06	27	26	.02	56	58	-.03
66	3,532	3,487	.01	1,488	1,498	-.01	174	187	-.07	29	27	.06	96	102	-.06
67	3,954	3,954	-.00	1,719	1,694	.02	185	196	-.06	32	31	.02	72	78	-.08
68	3,822	3,814	.00	1,702	1,690	.01	223	238	-.06	36	39	-.08	62	68	-.08
69	3,946	3,994	-.01	1,742	1,705	.02	262	284	-.08	33	38	-.16	76	83	-.08
70	4,394	4,507	-.03	1,497	1,451	.03	266	298	-.11	37	43	-.15	83	92	-.09
71	4,777	5,221	-.09	1,644	1,490	.10	281	320	-.12	40	45	-.12	81	90	-.10
72	4,362	4,736	-.08	1,717	1,568	.10	261	282	-.07	40	42	-.04	90	102	-.12
73	4,296	4,629	-.07	1,740	1,585	.10	298	313	-.05	45	49	-.09	90	97	-.07
74	4,641	4,750	-.02	1,771	1,695	.05	291	297	-.02	52	58	-.11	95	101	-.06
75	4,699	5,108	-.08	1,848	1,646	.12	372	390	-.05	70	88	-.25	99	102	-.03
76	4,646	5,551	-.16	1,796	1,465	.23	418	457	-.09	76	103	-.36	109	111	-.02
77	5,045	6,244	-.19	1,523	1,212	.26	437	499	-.12	82	128	-.56	141	135	.04
78	5,784	7,294	-.21	1,125	882	.28	538	615	-.13	115	189	-.64	178	165	.08
79	6,764	8,455	-.20	1,286	1,008	.28	675	785	-.14	114	182	-.60	225	206	.09
80	5,402	6,988	-.23	1,407	1,069	.32	733	879	-.17	110	173	-.57	235	216	.09
81	5,366	6,767	-.21	1,182	916	.29	727	917	-.21	93	155	-.67	209	187	.12
82	5,404	6,183	-.13	872	748	.17	792	1,060	-.25	107	189	-.77	238	208	.14
83	5,303	5,860	-.10	696	619	.12	907	1,201	-.25	116	213	-.84	295	254	.16
84	5,526	5,854	-.06	814	763	.07	940	1,284	-.27	107	194	-.81	341	298	.15

Source: Ministry of Agriculture and Fisheries, The Farm Household Economy Survey, various issues.
, Annual Consumption Survey, various issues.
Economic Planning Board, The Urban Household Living Expenditure Survey, various issues.
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues.

a/ Calculation based on the estimated demand elasticities and the estimated 3-year moving averages of direct nominal protection rates (for consumers) presented in Table 8'-2.

D_i = Actual consumption

D'_i = Consumption in the absence of direct price interventions

$$\frac{\Delta D'_i}{D_i} = \frac{D_i - D'_i}{D'_i}$$

Figure 10

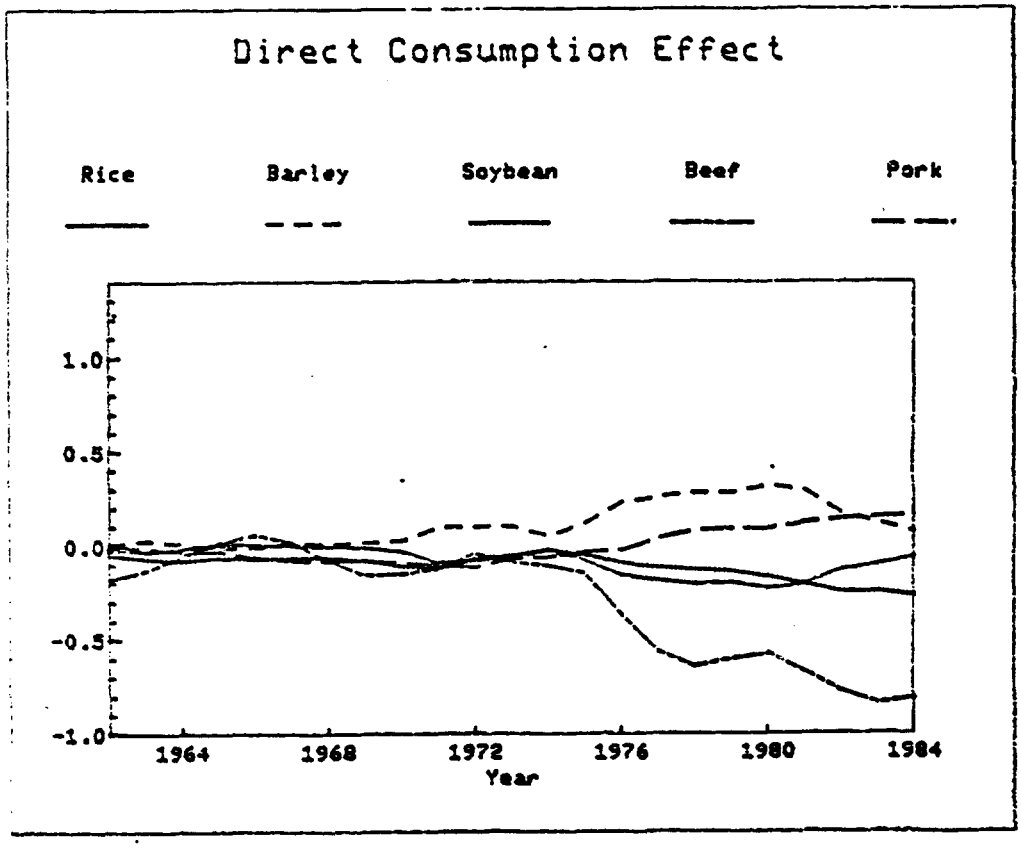

Direct Consumption Effect
Rice
Barley
Soybean
Beef
Pork
1.0
0.5
0.0
-0.5
-1.0
1964
1968
1972
1976
1980
1984
Year

Table 13f. Total Consumption Effect [a/]

Unit: 1,000 MT

Year	Rice			Barley			Soybean			Beef			Pork		
	D_R	D^*_R	$\Delta D^*_R/D^*_R$	D_B	D^*_B	$\Delta D^*_B/D^*_B$	D_S	D^*_S	$\Delta D^*_S/D^*_S$	D_{BF}	D^*_{BF}	$\Delta D^*_{BF}/D^*_{BF}$	D_{PK}	D^*_{PK}	$\Delta D^*_{PK}/D^*_{PK}$
1960	3,126	-	-	995	-	-	174	-	-	13	-	-	58	-	-
61	3,092	-	-	1,230	-	-	148	-	-	13	-	-	60	-	-
62	3,407	3,236	.05	1,235	1,327	-.07	185	176	.05	17	18	-.05	38	37	.04
63	3,136	3,012	.04	1,166	1,224	-.05	166	171	-.03	21	21	-.01	55	53	.03
64	3,709	3,522	.05	1,017	1,089	-.07	165	163	.02	32	31	.04	63	62	.01
65	3,925	3,696	.06	1,377	1,476	-.07	163	159	.02	27	25	.09	56	56	.00
66	3,532	3,335	.06	1,488	1,580	-.06	174	173	.01	29	26	.12	96	98	-.02
67	3,954	3,773	.05	1,719	1,787	-.04	185	181	.02	32	29	.09	72	74	-.03
68	3,822	3,633	.05	1,702	1,786	-.05	223	220	.02	36	35	.02	62	64	-.03
69	3,946	3,787	.04	1,742	1,807	-.04	262	261	.00	33	35	-.05	76	79	-.03
70	4,394	4,274	.03	1,497	1,534	-.02	266	271	-.02	37	38	-.04	83	87	-.04
71	4,777	4,899	-.03	1,644	1,582	.04	281	291	-.04	40	41	-.03	81	86	-.06
72	4,362	4,190	.04	1,717	1,805	-.05	261	262	-.00	40	38	.04	90	97	-.07
73	4,296	4,107	.05	1,740	1,830	-.05	298	294	.01	45	46	-.02	90	93	-.03
74	4,641	4,277	.09	1,771	1,946	-.09	291	282	.03	52	54	-.03	95	97	-.02
75	4,699	4,874	-.04	1,848	1,725	.07	372	371	.00	70	81	-.16	99	99	.00
76	4,646	5,262	-.12	1,796	1,534	.17	418	435	-.04	76	97	-.28	109	108	.01
77	5,045	5,921	-.15	1,523	1,264	.21	437	478	-.09	82	121	-.48	141	134	.06
78	5,784	6,910	-.16	1,125	920	.22	538	592	-.09	115	178	-.55	178	163	.09
79	6,764	8,043	-.16	1,286	1,051	.22	675	756	-.11	114	172	-.51	225	205	.10
80	5,402	6,628	-.19	1,407	1,113	.26	733	844	-.13	110	162	-.47	235	214	.10
81	5,366	6,489	-.17	1,182	947	.25	727	882	-.18	93	140	-.50	209	192	.09
82	5,404	6,183	-.13	872	743	.17	792	1,025	-.23	107	182	-.70	238	208	.15
83	5,303	5,758	-.08	696	629	.11	907	1,170	-.23	116	206	-.78	295	254	.16
84	5,525	5,780	-.04	814	772	.05	940	1,230	-.24	107	188	-.76	341	297	.15

Source: Ministry of Agriculture and Fisheries, The Farm Household Economy Survey, various issues.
_____, Annual Consumption Survey, various issues.
Economic Planning Board, The Urban Household Living Expenditure Survey, various issues.
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues.

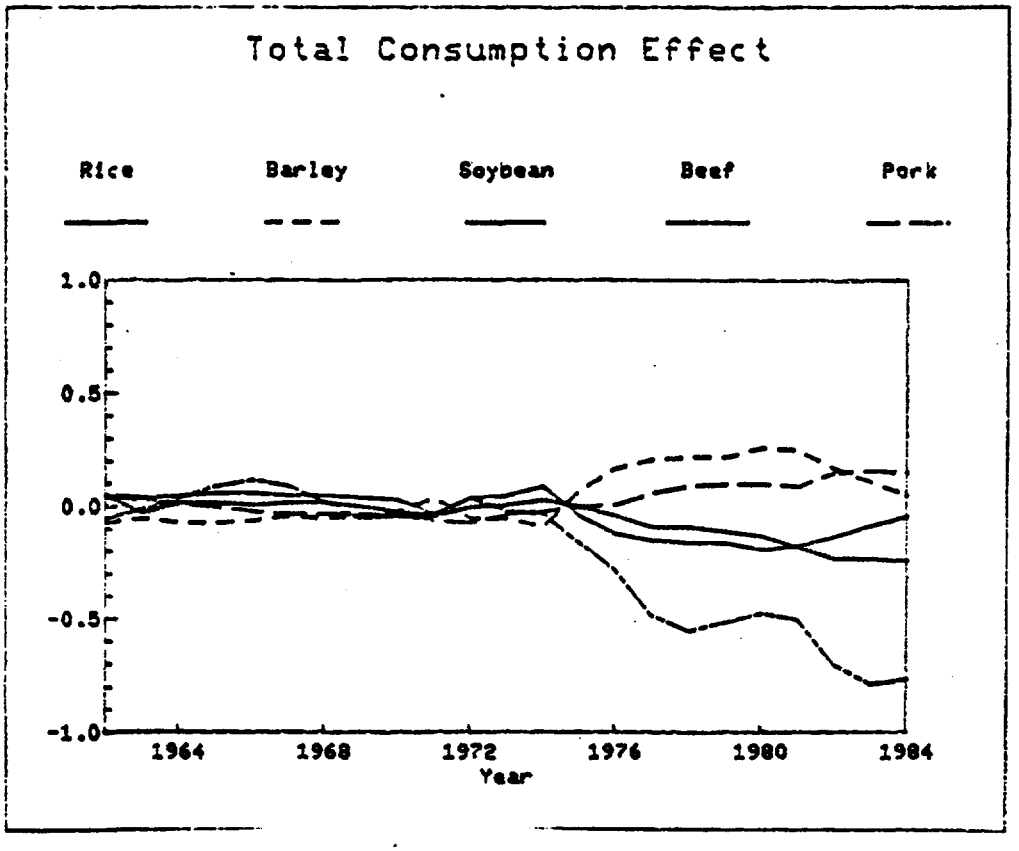
a/ Calculation based on the estimated demand elasticities and the estimated 3-year moving averages of total nominal protection rates (for producers) presented in Table 10'-2.

D_i = Actual consumption

D^*_i = Consumption in the absence of direct and indirect price interventions

$$\frac{\Delta D^*_i}{D^*_i} = \frac{D_i - D^*_i}{D^*_i}$$

Figure 11


Total Consumption Effect
Rice
Barley
Soybean
Beef
Pork
1.0
0.5
0.0
-0.5
-1.0
1964
1968
1972
1976
1980
1984
Year

declined in later years the effect was to reduce the level of consumption. For beef the effect was to reduce consumption in most years. In the case of barley and pork, the exchange rate policy combined with direct intervention had the effect of reducing consumption in earlier years but increasing consumption in later years.

The Effect on Foreign Exchange Earnings

Changes in production and consumption of tradable agricultural products, as well as changes in the use of tradable inputs, necessarily result in changes in foreign exchange spending for a country like Korea, which is chronically dependent on imports of food and feed grain. In order to isolate the direct foreign exchange implications of changes in production, consumption, and input use estimated above, we simply assume that agricultural price policy is not affected by foreign exchange availability. It is also assumed that non-agricultural imports and exports are independent of agricultural price policies.

Under the above assumptions, the direct short- and long-run effect on foreign exchange gain or loss of price intervention for each product was measured by:

$$\Delta E_i = (\Delta Q_i' - \Delta D_i') P_i^B - \Delta I_i' P_{Ii}^B$$

where: ΔE_i = Gain in foreign exchange earnings

$\Delta Q_i'$ = Change in output in the absence of direct price intervention

$\Delta D_i'$ = Change in consumption in the absence of direct price intervention

$\Delta I_i'$ = Change in the use of tradable inputs to produce output i in the absence of direct price intervention

P_i^B = Border price of product i in U.S. dollars

P_{Ii}^B = Border price of input i in U.S. dollars

Total short- and long-run effect was measured by:

$$\Delta E_i = (\Delta Q_i^* - \Delta D_i^*) P_i^B - I_i^* \cdot P_{Ii}^B$$

where: ΔQ_i^* = Change in output i in the absence of direct and indirect price intervention

ΔD_i^* = Change in consumption in the absence of direct and indirect price intervention

ΔI_i^* = Change in the use of tradable input i to produce output i in the absence of direct and indirect price intervention

Changes in the use of tradable inputs (fertilizer for rice,

barley, and soybean, and corn for beef and pork production) are assumed to be proportional to change in output of each product.[8/] The results of foreign exchange effects are presented in Tables 14a, 14b, 14c, and 14d.

Table 14a and 14b indicate that direct price intervention had, both in the short run and long run, a positive effect on foreign exchange earnings throughout 1962-84. The amount of foreign exchange gained due to direct long-run intervention is estimated as US$130 million, or 16 percent of total exports, in 1970, and US1.8 billion, or 6 percent of total exports, in 1984. Although intervention had the effect of requiring greater input use (fertilizer and feed corn), a positive effect on output could more than offset this negative effect, hence resulting in a positive effect throughout the period concerned.

When combined with indirect intervention through trade and exchange rate policy as measured in Tables 14c and 14d, direct intervention resulted in a loss of foreign exchange and an increase of imports until the early 1970s, but resulted in a gain of foreign exchange thereafter through 1984. The net loss of foreign exchange due to the long-run effect of total intervention is estimated as US$239 million, or 29 percent of total exports in 1970; by 1984, the effect was to gain US$1.4 billion, representing roughly 5 percent of Korea's total exports for that year.

8/ Inputs used per unit of outputs for each product are estimated as:

Rice	.031		0.5 for 1960-69		4.15 for 1960-69
Barley	.046	Beef:	1.5 for 1970-79	Pork:	4.78 for 1970-79
Soybean	.030		2.0 for 1980-84		5.37 for 1980-84

Table 14a. Direct Short-Run Effect of Price Interventions on Foreign Exchange Earnings (Gain: +, Loss: -)

Unit: million US dollars

Year	Value of Total Export	Effect on Outputs	Proportion	Effect on Inputs	Total Effects	Proportion
	(1)	(2)	(3)=(2)/(1)	(4)	(5)=(2)+(4)	(6)=(5)/(1)
1960	32.8					
61	40.9					
62	54.8	98.1	1.790	-3.8	94.3	1.721
63	86.8	97.1	1.119	-3.0	94.1	1.084
64	119.1	111.4	.935	-3.9	107.5	.903
65	175.1	73.3	.419	-3.5	69.8	.399
66	250.3	17.3	.069	-1.9	15.4	.062
67	320.2	-6.9	-.022	-2.4	-9.3	-.029
68	455.4	8.5	.019	-4.3	4.2	.009
69	622.5	63.8	.102	-6.2	57.6	.093
70	835.2	94.2	.113	-9.4	84.8	.102
71	1,067.6	174.0	.163	-10.9	163.1	.153
72	1,624.1	194.1	.120	-10.6	183.5	.113
73	3,225.0	341.8	.106	-16.7	325.1	.101
74	4,460.4	355.5	.080	-16.2	339.3	.076
75	5,081.0	263.1	.052	-16.4	246.7	.049
76	7,715.3	429.0	.056	-16.7	412.3	.053
77	10,046.5	718.8	.072	-25.5	693.3	.069
78	12,710.6	1,342.6	.106	-32.8	1,309.8	.103
79	15,055.5	1,070.5	.071	-37.3	1,033.2	.069
80	17,504.9	1,353.2	.077	-33.0	1,320.2	.075
81	21,253.8	1,608.6	.076	-25.3	1,583.3	.074
82	21,853.4	1,299.0	.059	-21.0	1,278.0	.058
83	24,445.1	1,339.4	.055	-26.5	1,312.9	.054
84	29,244.9	1,222.0	.042	-30.6	1,191.4	.041

Source: The Bank of Korea, Monthly Economic Statistics, various issues.
Also see Appendix 40a.

Table 14b. Direct Long-Run (Cumulative) Effect of Price Interventions on Foreign Exchange Earnings (Gain: +, Loss: -)

Unit: million US dollars

Year	Value of Total Export	Effect on Outputs	Proportion	Effect on Inputs	Total Effects	Proportion
	(1)	(2)	(3)=(2)/(1)	(4)	(5)=(2)+(4)	(6)=(5)/(1)
1960	32.8					
61	40.9					
62	54.8	98.1	1.790	-3.8	94.3	1.721
63	86.8	133.1	1.533	-4.5	128.6	1.482
64	119.1	188.2	1.580	-7.0	181.2	1.521
65	175.1	144.5	.825	-7.0	137.5	.785
66	250.3	147.2	.588	-9.7	137.5	.549
67	320.2	102.5	.320	-7.3	95.2	.297
68	455.4	75.4	.166	-7.7	67.7	.149
69	622.5	107.3	.172	-9.8	97.5	.157
70	835.2	144.8	.173	-14.4	130.4	.156
71	1,067.5	221.1	.207	-17.8	203.3	.190
72	1,624.1	268.1	.165	-17.2	250.9	.154
73	3,225.0	502.1	.156	-29.2	472.9	.147
74	4,460.4	712.7	.160	-38.0	674.7	.151
75	5,081.0	676.9	.133	-39.6	637.3	.125
76	7,715.3	677.0	.088	-37.9	639.1	.083
77	10,046.5	892.6	.089	-44.8	847.8	.084
78	12,710.6	1,664.4	.131	-58.5	1,605.9	.126
79	15,055.5	1,423.7	.095	-84.6	1,339.1	.089
80	17,504.9	1,776.2	.101	-94.1	1,682.1	.096
81	21,253.8	2,210.7	.104	-73.5	2,137.2	.101
82	21,853.4	1,907.3	.087	-52.8	1,854.5	.085
83	24,445.1	1,957.3	.080	-64.6	1,892.7	.077
84	29,244.9	1,888.5	.065	-70.2	1,818.3	.062

Source: The Bank of Korea, Monthly Economic Statistics, various issues.
Also see Appendix 40b.

Table 14c. Total Short-Run Effect of Price Interventions on Foreign Exchange Earnings (Gain: +, Loss: -)

Unit: million US dollars

Year	Value of Total Export	Effect on Outputs	Proportion	Effect on Inputs	Total Effects	Proportion
	(1)	(2)	(3)=(2)/(1)	(4)	(5)=(2)+(4)	(6)=(5)/(1)
1960	32.8					
61	40.9					
62	54.8	-91.5	-1.670	5.3	-86.2	-1.573
63	86.8	-96.4	-1.111	4.8	-91.6	-1.055
64	119.1	-142.1	-1.193	5.3	-136.8	-1.149
65	175.1	-118.8	-.678	4.5	-114.3	-.653
66	250.3	-156.0	-.623	9.5	-146.5	-.585
67	320.2	-180.7	-.564	5.6	-175.1	-.547
68	455.4	-159.4	-.350	3.1	-156.3	-.343
69	622.5	-153.7	-.247	1.8	-151.9	-.244
70	835.2	-121.7	-.146	-.1	-121.8	-.146
71	1,067.6	-23.4	-.022	-.8	-24.2	-.023
72	1,624.1	13.9	.009	-2.8	11.1	.007
73	3,225.0	34.4	.011	-7.9	26.5	.008
74	4,460.4	-63.0	-.014	-4.6	-67.6	-.015
75	5,081.0	-100.2	-.020	-2.8	-103.0	-.020
76	7,715.3	158.1	.020	-4.3	153.8	.020
77	10,046.5	502.8	.050	-15.6	487.2	.048
78	12,710.6	1,061.5	.084	-23.9	1,037.6	.082
79	15,055.5	819.3	.054	-22.3	797.0	.053
80	17,504.9	985.0	.056	-7.2	977.8	.056
81	21,253.8	1,130.0	.053	.0	1,130.0	.053
82	21,853.4	958.4	.044	2.0	960.4	.044
83	24,445.1	1,029.4	.042	-.6	1,028.8	.042
84	29,244.9	956.3	.033	-6.1	950.2	.032

Source: The Bank of Korea, Monthly Economics Statistics, various issues. Also see Appendix 40c.

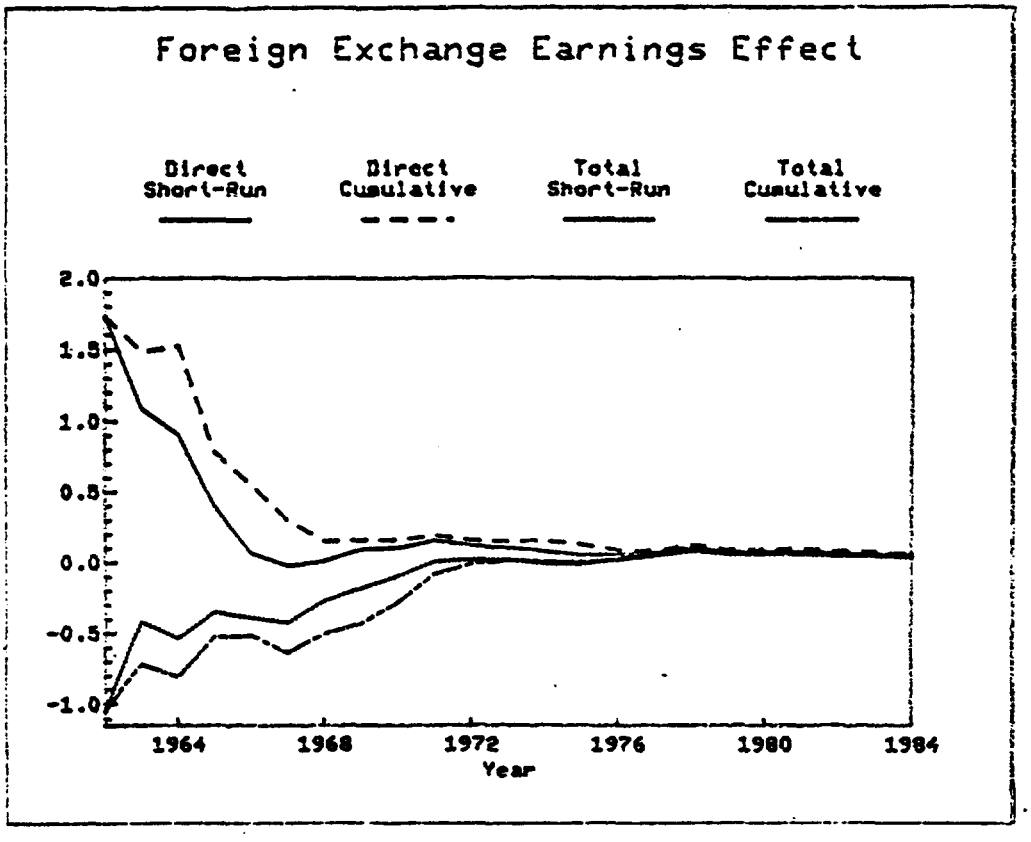
Table 14d. Total Long-Run (Cumulative) Effect of Price Interventions on Foreign Exchange Earnings (Gain: +, Loss: -)

Unit: million US dollars

Year	Value of Total Export	Effect on Outputs	Proportion	Effect on Inputs	Total Effects	Proportion
	(1)	(2)	(3)=(2)/(1)	(4)	(5)=(2)+(4)	(6)=(5)/(1)
1960	32.8					
61	40.9					
62	54.8	-61.0	-1.113	3.4	-57.6	-1.051
63	86.8	-67.0	-.772	4.3	-62.7	-.722
64	119.1	-101.3	-.851	4.4	-96.9	-.814
65	175.1	-97.7	-.558	4.8	-92.9	-.531
66	250.3	-144.8	-.579	12.8	-132.0	-.527
67	320.2	-215.6	-.673	9.5	-206.1	-.644
68	455.4	-236.9	-.520	6.4	-230.5	-.506
69	622.5	-272.6	-.438	4.3	-268.3	-.431
70	835.2	-239.0	-.286	.4	-238.6	-.286
71	1,067.6	-86.9	-.081	-2.8	-89.7	-.084
72	1,624.1	-14.3	-.009	-5.3	-19.6	-.012
73	3,225.0	65.8	.020	-12.3	53.5	.017
74	4,460.4	37.2	.008	-15.3	21.9	.005
75	5,081.0	19.2	.004	-14.1	5.1	.001
76	7,715.3	160.0	.021	-12.4	147.6	.019
77	10,046.5	517.3	.051	-22.9	494.4	.049
78	12,710.6	1,168.8	.092	-35.9	1,132.9	.089
79	15,055.5	1,045.0	.069	-52.0	993.0	.066
80	17,504.9	1,316.7	.075	-48.5	1,268.2	.072
81	21,253.8	1,627.5	.077	-29.5	1,598.0	.075
82	21,853.4	1,404.5	.064	-10.7	1,393.8	.064
83	24,445.1	1,449.4	.059	-3.2	1,446.2	.059
84	29,244.9	1,419.6	.049	-6.0	1,413.6	.048

Source: The Bank of Korea, Monthly Economics Statistics, various issues.
Also see Appendix 40d.

Figure 12


Foreign Exchange Earnings Effect
Direct Short-Run
Direct Cumulative
Total Short-Run
Total Cumulative
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
1964
1968
1972
1976
1980
1984
Year

Chapter 5

THE EFFECT OF INTERVENTION ON THE GOVERNMENT BUDGET

The Korean government's trade policy has traditionally not been designed to raise any significant amount of revenues by taxing export commodities. On the contrary, various benefits are provided to exporters in the form of export subsidies and preferential credit. There are two sources of revenues from agricultural pricing policy: import duties levied on imported agricultural commodities, and the profits of two parastatal agencies from sales of imported meat stuffs and miscellaneous agricultural products, such as sesame, red pepper, and peanuts.9/

Tariff rates vary, ranging from 5 percent for rice and wheat, 7 percent for feed corn, 10 percent for soybeans, and 22 percent for meat and pork, to 30 percent for corn for industrial use. Significant tariff exemptions are granted for imports of major cereals, such as rice, wheat, and feed corn, on grounds of price stabilization in the domestic market. The total amount of tariffs due on imports of major cereals for

---

9/ One of the parastatals is the National Livestock Cooperatives Federation (NLCF), whose main function is to provide livestock development loans to farmers and related agri-business. The profits made from the sales of imported meats are used as a supplementary resource for financing livestock-related development activities. The other is the Agricultural and Fisheries Development Corporation (AFDC) which carries out buffer-stock operations for selected non-grain agricultural products. The profits of this agency are incorporated into the Agricultural Products Price Stabilization Fund.

the 1981-84 period was 365.4 billion won, but actual collections amounted to 192.0 billion won, with the rest being exempted. Annual tariff revenues and profits are presented in Appendix 42.

Included in the major categories of government expenditures are direct production and consumption subsidies for staple food grains (mainly rice and barley) and direct subsidies to farmers for fertilizer, farm machinery, and pesticides. Prior to 1968, when the government sold its grain at a controlled price after adding intermediate handling and transportation costs to the original acquisition price, there was no financial loss due to price policy. But, as explained in Chapter 2, the implementation of a two-price system for rice and barley in 1969 caused the government to incur a substantial loss every year.

The total accumulated loss during the 1970-84 period was 2,073.1 billion won, with 58.3 percent (or 1,208.2 billion won) having been spent to subsidize the price of rice. The loss due to the subsidy for barley was 34.0 percent (or 705 billion won), the loss due to the flour price subsidy was 6.2 percent (or 128.0 billion won), and the remaining loss was for miscellaneous grains. This deficit in the Grain Management Fund (GMF) is taken as an expenditure associated with grain price policy, but a closer look at the accounting makes the reported deficit a rather dubious measure of true subsidy.

To break down the GMF deficit by source of expenditure for 1984, for example, 207.2 billion won or 48.6 percent of the total loss of 426.2 billion won is attributable to negative price differentials, 4.1 billion won or 9.7 percent to intermediate handling and

transportation costs, and 177.7 billion won or 41.7 percent resulted from the interest payments on both the long-term borrowings from the central bank and the short-term grain bonds issued to supplement grain acquisition funds.

Another major source of government expenditure is the fertilizer price subsidy. A large deficit has existed in the Fertilizer Account since 1970 because of a negative difference between procurement and sale prices, plus export subsidy. The fertilizer prices paid by farmers were below the prices received by manufacturers, with the difference in price and intermediate handling costs borne by the government throughout the 1970-84 period. The current procedure is to include interest payments on funds borrowed from the central bank. In 1984, for example, of the total deficit of 98.5 billion won, interest payments constituted about 60.0 percent, or 59.1 billion won, the loss due to price differential 8.1 percent, or 8.0 billion won, and handling and transportation costs 31.9 percent, or 31.4 billion won.

Since these interest payments cannot be regarded as true subsidies for producers and consumers, they were excluded from government expenditures. Only the price subsidy portion of expenditures for the 1970-84 period was included in Table 15. As the table shows, net expenditures as a proportion of the total budget and the budget deficit displayed no uniform trend.

In order to investigate the degree of bias against or in favor of agriculture in the government's investments and expenditures, the

Table 15. Effect of the Pricing Policy on the Budget

Unit: Billion won
%

Year	Total Revenues [a/]	Total Expenditures [b/]	Net Expenditures	Net Expenditures as a Proportion of	
				Total Budget	Budget Deficit
	Billion won	Billion won	Billion won	%	%
1970	0.5	8.4	7.9	1.5	32.0
71	1.9	6.0	4.1	.6	5.4
72	5.3	12.0	6.7	..8	3.5
73	8.5	13.0	4.5	.5	5.2
74	13.1	155.1	142.0	10.0	47.2
75	19.0	154.6	135.0	6.3	29.1
76	13.4	10.0	-3.4	.1	.9
77	16.4	38.8	22.4	.6	4.7
78	67.1	125.7	58.6	1.2	9.5
79	62.9	178.5	115.6	1.9	26.3
80	84.4	210.6	126.2	1.5	10.8
81	111.1	121.8	10.7	.1	.5
82	145.2	52.7	-92.5	.8	4.2
83	149.5	177.4	27.9	.2	2.9
84	120.4	249.7	129.3	.9	14.0

Source: See Appendix 42.

a/ Includes tariffs and profits made from sales of non-grain agricultural commodities such as meats, peanuts, sesame, etc.
b/ Includes price subsidy for major cereals, fertilizer, farm machinery and livestock raising.

following two measures were calculated:

$$GIB = \frac{CI_A/CI}{GDP_A^{NI}/\ GDP}$$

$$GEB = \frac{GE_A/GE}{GDP_A^{NI}\ /\ GDP}$$

where:

GIB = Index of government investment bias

GEB = Index of government expenditure bias

CI = Total public investment expenditures

CI_A = Public investment expenditure on agriculture

GDP = Total GDP

GDP_A^{NI} = GDP originating in agriculture in the case of no intervention

= GDP_A + Net transfer out of agriculture

GE = Total government budget expenditure

GE_A = Government budget expenditure on agriculture

Table 16 gives the results of our calculations. According to the table, GIB (in the fourth column) has been steadily rising (with a few years' exception), reaching as high as 2 in 1984 from about 0.4-0.5 in the early 1960s. GEB shows a trend similar to that of GIB. This implies that the agricultural sector has been receiving more investment resources relative to what it has contributed to the growth of the national output, hence intensifying the investment and expenditure bias toward agriculture.

Table 16. Government Investment (GIB) and Total Expenditure (GEB) Bias

Year	GDP^{NI}_{A}/GDP	CIA/CI	GIB	Excluding Defense	Excluding Budget	Including Defense	Including Budget
				GEA/GE	GEB	GEA/GE	GEB
	(1) %	(2) %	(2)/(1)	(3) %	(3)/(1)	(4) %	(4)/(1)
1960	34.5	20.6	.597	5.8	.168	3.4	.99
61	45.5	14.4	.316	9.6	.211	6.1	.134
62	44.2	26.8	.606	15.3	.346	11.2	.253
63	48.2	18.3	.380	11.7	.243	8.0	.166
64	55.6	18.9	.340	10.9	.196	6.9	.124
65	44.5	23.4	.526	11.2	.252	6.8	.153
66	45.9	22.7	.495	9.2	.200	6.5	.142
67	35.4	16.8	.475	6.7	.189	4.8	.136
68	29.9	22.4	.749	10.3	.344	7.7	.258
69	28.8	25.1	.872	11.8	.410	9.1	.316
70	26.3	21.5	.817	9.6	.365	7.3	.278
71	23.1	21.7	.939	9.4	.407	6.8	.294
72	20.3	23.8	1.172	7.2	.355	5.3	.261
73	18.2	23.3	1.280	7.7	.423	5.5	.302
74	25.9	21.6	.834	6.2	.239	4.3	.166
75	24.0	20.5	.854	8.0	.333	5.5	.229
76	17.6	20.4	1.159	8.4	.477	5.3	.301
77	14.7	19.0	1.293	8.5	.578	5.3	.361
78	14.3	18.9	1.322	7.8	.545	5.0	.350
79	12.3	15.5	1.260	6.9	.561	4.6	.373
80	10.2	14.7	1.441	8.3	.814	5.4	.529
81	10.3	19.5	1.893	9.5	.922	6.1	.592
82	9.7	16.0	1.649	8.0	.825	5.1	.526
83	8.9	17.7	1.989	7.5	.843	4.9	.551
84	9.0	18.2	2.022	6.9	.767	4.7	.522

Source: Calculated from Appendix 42-44.

Chapter 6

INTERSECTORAL TRANSFER OF RESOURCES

Transfers to Agriculture

The transfer of resources to the agricultural sector from the non-agricultural sector can be found in non-investment transfers and public investment expenditures. Non-investment transfers include implicit price subsidies and agricultural credit subsidies that would have been realized in the absence of government intervention. The investment portion includes actual public expenditures for the agricultural sector.

Transfers due to Price Subsidies

For each commodity, and for fertilizer, both the direct transfer to agriculture due to direct intervention and the total transfer due to direct and indirect intervention were estimated. The direct transfer was calculated as the excess of the domestic producer price over the border price (evaluated at the nominal exchange rate, E_0) multiplied by current output. The total transfer was given by the excess of the domestic producer price over the producer price that would have prevailed in the absence of government intervention (or the border price evaluated at the free trade equilibrium exchange rate, E*) multiplied by actual output. Each time series of absolute levels of transfers was deflated by CPI. That is,

$$\text{Direct transfer} = (P_A - P_A') Q_A$$

$$\text{Total transfer} = (P_A - P_A^*) Q_A$$

where:

P_A = Domestic producer price of product A

P_A' = Border price of product A evaluated at the nominal exchange rate, E_o

P_A^* = Border price of product A evaluated at the free trade equilibrium exchange rate, E^*

Q_A = Output

Transfers due to Value-Added

Since the prices of purchased inputs are affected by price intervention, we measured the combined value-added transfer of product and input price interventions. The input considered in the calculation is fertilizer. Direct and total transfers on value-added are measured as:

$$\text{Direct transfer} = (VA_A - VA_A') Q_A$$

$$\text{Total transfer} = (VA_A - VA_A^*) Q_A$$

where:

$VA_A = P_A - a_{Aj} P_j$

$VA_A' = P_A' - a_{Aj} P_j'$

$VA_A^* = P_A^* - a_{Aj} P_j^*$

P_j = Price of fertilizer paid by farmers

P_j' = Border price of fertilizer evaluated at official exchange rate, E_o

P_j^* = Border price of fertilizer evaluated at free trade equilibrium exchange rate, E^*

a_{Aj} = Units of fertilizer per unit of output A

Agricultural Credit Subsidy

Agricultural loans in Korea are distributed through various funds in accordance with the financing sources and the purpose of the loans, and each loan fund is operated with different lending criteria. With the government supplying a major portion of the finances, the National Agricultural Cooperatives Federation exercises extensive control over such loans by determining eligibility criteria, interest rate, loan period, and so forth.

To simplify the computation of the implicit credit subsidy, all loans were regrouped into short-term, intermediate-term, and long-term loans, and the average interest rate was estimated for each category. The annual implicit subsidy flows in agricultural credit were measured by:

$$S_t = C_t \left[(1 + r_t^*)(1 + \pi_t) - (1 + i_t)\right]$$

where:

S_t = Amount of credit subsidy in year t

C_t = Credit allocated to agriculture in year t

r_t^* = Real reference interest rate in the absence of subsidy

π_t = Inflation rate

i_t = Actual interest rate charged

In actual measurement, the outstanding loan balance at the beginning of each year was used for C_t, assuming that this balance was repaid at the end of the year. For the real reference interest rate r_t^*, a rate of 10% was applied throughout the period concerned,

since it is commonly recognized as the average social rate of return on government investments in most LDCs. Appendix Table 43 gives the estimated reference nominal interest rate (column 6) with inflation rate taken into account and implicit subsidy rate for each loan category. By multiplying the amount of loan in each category by the implicit subsidy rate we obtain the subsidy. The results are presented in Appendix Table 44.

Investment

Investment covers public expenditures on the rural infrastructure, such as irrigation systems, rural roads, rural housing, as well as expenditures on agricultural research and extension services.

Transfer out of Agriculture

A farmland tax and miscellaneous public charges are the only direct transfers out of agriculture. The average rate of farmland tax on an individual crop is about 6 percent. If total output is less than 1.4 metric tons, no tax is levied. This exemption applies to about two-thirds of the farmers in Korea.

Tables 17a, 17b, and 17c present the estimated "real" transfer of resources between the agricultural and non-agricultural sectors with no government intervention. Table 17a presents the transfer for each product due to output price and input price intervention, and Table 17b the transfer due to both output price and input price intervention except for inputs which cannot be allocated by product. The sum of price-related and non-price transfers is presented in Table 17c.

The results show a modest flow of resources into the agricultural sector due to direct price intervention throughout the period with two exceptional years, 1966 and 1967. Although the size of the transfer is subject to large year-to-year fluctuations, it generally shows an increasing trend. Price-related transfers to the agricultural sector due to value added in real terms (1980 = 100.0) accounted for 10.5 percent of the GDP originating in the agricultural sector during 1962-69 and increased to 30.5 percent during 1980-84 (see columns 25 of Table 17a and 21b of Table 17b). If non-price transfers (or public investment in agriculture) are included, the relative share in agricultural GDP was 12.4 percent during 1962-69 and 38.6 percent during 1980-84 (see column 15 of Table 17c).

If one takes into account the impact of overvaluation of the exchange rate, the pattern of resource flow is completely different. There are negative flows throughout the 1960s and for 1973-75, implying that resources were extracted from the agricultural sector and sent to the non-agricultural sector. Measured in terms of relative share of agricultural GDP, the price-related resource flow from the agricultural sector to the non-agricultural sector constituted 25.9 percent during 1962-69, while the total sum of resource flow (price-related plus public investment in agriculture) was 22.3 percent in the same period (see columns 26 of Table 17a, 22 of Table 17b, and 16 of Table 17c). This reverse flow of resources in the 1960s is mainly attributable to persistent overvaluation of the domestic currency; in 1973-75 it was the result of extraordinarily high world prices for food grain. For the

rest of the period through 1984, as the degree of exchange rate overvaluation gradually lessened and price subsidization of major food crops intensified, the total transfer of resources to the agricultural sector became positive and consistently increased thereafter. The relative share of price-related transfers in agricultural GDP was 26.2 percent during 1980-84. When public investment is added, the share increased to 34.2 percent in the same period, implying that over one-third of agricultural GDP came from the non-agricultural sector during 1980-84 (see columns 26 of Table 17a, 22 of Table 17b, and 16 of Table 17c).

Overall, agricultural pricing policy per se resulted in a modest financial flow from the non-agricultural to the agricultural sector throughout the 1962-84 period, but trade and exchange rate policy more than offset the effect of price policy and effected a resource flow in reverse direction in the 1960s. For other years through 1984, the resource flow into the agricultural sector far exceeded the flow out of agriculture, mainly because of intensive price supports.

Table 17a. Direct and Total Real Transfers due to Output Price and Input Price Interventions out of(-) and into(+) Agriculture (in billions units of Korean currency of 1980)

Year	Transfers on Output Prices[a/]											
	Rice		Barley		Soybean		Beef		Pork		All Products	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
1962	136.1	-422.1	42.6	-109.5	5.1	-16.8	1.7	-13.6	24.0	-12.4	209.5	-574.4
63	665.8	-142.3	220.8	110.4	22.9	27.7	1.9	-20.3	19.1	-17.4	930.5	-41.9
64	219.1	-564.7	147.3	-10.5	20.9	29.2	-10.2	-37.0	5.5	-34.0	382.6	-617.0
65	-70.6	-576.8	81.4	-21.8	16.6	23.3	0.4	-16.9	13.7	-7.7	41.5	-599.9
66	25.4	-872.5	-98.1	-399.1	19.5	27.6	1.6	-32.0	12.5	-49.5	-39.1	-1325.5
67	-49.7	-635.9	-59.5	-248.4	43.9	22.5	13.1	-11.3	30.2	0.3	-22.0	-872.8
68	99.1	-425.7	34.2	-131.8	17.1	-10.6	27.6	-1.5	52.2	25.0	230.2	-544.6
69	237.9	-415.5	86.0	-50.7	23.9	4.1	20.1	-6.3	28.7	-5.7	396.6	-474.1
70	255.9	-292.9	20.7	-121.6	43.0	24.1	22.7	-5.3	48.4	18.3	390.7	-377.4
71	619.4	141.2	135.7	20.2	24.6	12.2	24.9	-10.1	60.2	24.7	864.8	188.2
72	856.3	548.6	193.0	109.1	33.8	17.5	33.2	6.6	30.7	3.2	1147.0	685.0
73	159.7	-130.6	59.5	-32.9	22.4	4.6	21.6	-8.0	58.1	33.8	321.3	-133.1
74	39.7	-790.8	-15.6	-160.8	26.9	-10.5	28.6	-10.0	19.6	-25.1	99.2	-997.2
75	235.4	-509.7	-27.2	-213.5	33.8	3.9	37.4	-3.1	58.2	14.5	337.6	-707.9
76	1320.5	1016.9	86.1	5.5	59.4	43.6	100.6	72.6	76.8	43.4	1643.4	1182.0
77	1678.2	1484.9	133.4	113.1	81.5	67.4	147.5	125.9	68.1	36.2	2108.7	1827.5
78	1357.4	1145.2	246.2	220.3	87.8	79.6	221.7	205.6	66.3	18.7	1979.4	1669.4
79	1934.0	1676.6	282.3	237.3	30.5	18.4	174.0	137.8	-17.4	-107.1	2403.4	1963.0
80	1101.9	889.5	121.5	89.9	71.3	61.3	133.3	86.1	43.9	-43.1	1471.9	1083.7
81	1383.7	1120.5	111.0	81.9	110.8	100.8	157.3	128.8	-153.6	-75.3	1609.2	1356.7
82	1308.3	1121.2	139.8	126.4	93.1	88.2	189.5	173.3	-80.7	-166.2	1650.0	1342.9
83	1122.6	981.7	156.4	146.4	97.2	93.6	208.3	194.4	-50.0	0.6	1534.5	1416.7
84	1091.8	935.2	117.6	105.4	101.7	96.0	276.5	261.8	8.0	-38.1	1595.6	1360.3

Table 17a. Con'd

Year	Transfers on Purchased Inputs										Sum of Transfers on All Product and Input Prices		Sum of Transfers as a Share of GDP_A	
	Fertilizer		Feed		Others		Credit		All Inputs		Direct	Total	Direct	Total
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total				
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(11)+(21) / (23)	(12)+(22) / (24)	(%) (25)	(%) (26)
1962	-21.8	-8.4	-8.4	7.3	-3.0	-31.5	20.5	15.0	-12.4	-17.6	196.9	-591.9	11.0	-33.2
63	-16.0	-2.6	-6.1	10.6	4.1	-44.0	44.6	32.2	26.6	-3.8	957.1	-45.8	38.4	-1.8
64	-.3	27.8	-6.6	7.9	.0	-36.2	64.5	51.4	57.5	50.8	0.2	-579.1	15.0	-19.7
65	-16.8	3.3	-6.1	4.2	-4.2	-24.0	18.6	15.8	-8.6	-.8	33.1	-600.6	1.4	-25.9
66	-16.9	6.4	-11.6	5.0	-8.6	-25.1	12.8	11.2	-24.3	-2.5	-63.4	-1329.8	-2.6	-54.7
67	3.9	33.6	-10.4	4.9	-8.7	-23.0	9.1	8.0	-6.1	23.5	-29.1	-849.2	-1.2	-36.1
68	1.5	30.1	-12.4	7.6	-6.5	-23.0	12.8	11.1	-4.5	25.8	225.7	-518.9	8.8	-20.3
69	-5.3	20.7	-10.8	6.6	-6.6	-26.1	14.5	12.7	-8.2	14.0	388.4	-460.1	13.3	-15.8
70	-11.6	10.6	-11.9	7.4	-3.4	-19.6	28.1	25.1	1.2	23.5	391.9	-353.8	13.0	-11.8
71	-8.9	18.8	-12.6	11.7	2.7	-16.0	29.3	26.2	10.5	40.7	875.5	228.9	26.5	6.9
72	8.2	27.1	-7.0	9.5	8.8	.7	49.4	47.5	59.3	84.7	1206.4	769.7	33.4	21.3
73	25.9	48.7	-6.5	9.7	-2.1	-5.6	30.5	30.0	47.8	82.8	365.6	-53.6	10.4	-1.5
74	1.0	25.1	-13.7	6.6	-2.7	-23.6	155.1	141.9	139.7	150.1	238.9	-847.2	5.0	-17.7
75	-26.1	-3.7	-17.3	6.5	.0	-19.2	122.3	113.8	78.9	97.1	416.5	-610.5	8.2	-12.0
76	-52.8	-41.6	-7.3	14.1	16.6	16.0	59.9	59.8	16.5	48.3	1659.8	1230.3	28.5	21.1
77	-35.6	-24.8	-.6	21.5	22.5	26.8	48.8	49.4	35.0	72.9	2143.7	1900.3	34.5	30.6
78	-39.5	-28.9	-7.3	21.6	16.2	11.8	70.8	69.9	40.2	74.5	2019.8	1743.8	29.9	25.8
79	-2.3	21.5	-17.3	25.5	19.6	5.2	143.1	137.5	143.1	189.5	2546.4	2150.3	38.0	32.1
80	22.4	51.1	-19.2	26.0	12.9	2.0	310.1	296.1	326.0	375.2	1798.2	1458.9	37.0	30.0
81	-10.0	8.5	-11.5	17.1	16.7	9.4	141.2	137.8	136.5	172.8	1745.6	1529.3	31.6	27.7
82	-29.0	-21.4	-9.4	20.3	15.8	9.7	9.2	9.1	-13.4	17.7	1636.6	1360.5	30.3	25.2
83	-37.4	-31.8	-3.7	21.8	15.5	12.5	-8.4	-8.3	-34.0	-5.8	1500.6	1410.9	27.1	25.4
84	-31.9	-26.0	-6.1	15.1	10.1	9.1	16.1	16.1	-11.9	14.4	1583.4	1374.6	26.3	22.8

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues
_____, The Cost of Production Survey, various issues
_____, Farm Household Economy Survey, various issues
National Agricultural Cooperatives Federation, The Rural Price and Wage Survey, various issues
_____, Fertilizer Yearbook, various issues
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues
Economic Planning Board, The Summary of Government Budget, various issues
_____, Consumer Price Statistics Yearbook, various issues
The Bank of Korea, The Price Survey, various issues
FAO, Trade Yearbook, various issues

a/ The real direct and total transfers are defined as:

$$\text{Direct transfer} = y_A - y_A' = Y_A/CPI - Y_A'/CPI' = Y_A/CPI - Y_A'/[\Sigma\alpha_A P_A' - (1-\Sigma\alpha_A)P_{NA}]$$

$$\text{Total transfer} = y_A - y_A^* = Y_A/CPI - Y_A^*/CPI^* = Y_A/CPI - Y_A^*/[\Sigma\alpha_A P_A^* - (1-\Sigma\alpha_A)P_{NA}^*]$$

where y_A = Realized real income
y_A' = Real income in the ansence of direct price intervention
y_A^* = Real income in the absence of total price intervention
Y_A = Realized nominal income
Y_A' = Nominal income in the absence of direct price intervention
Y_A^* = Nominal income in the absence of total price intervention
CPI = Consumer price index (1980 = 100.0)
CPI' = Consumer price index in the absence of direct price intervention(Cf. Appendix 46)
CPI* = Consumer price index in the absence of total price intervention(Cf. Appendix 46)
P_A' = Consumer price of product A in the absence of direct price intervention
P_A^* = Consumer price of product A in the absence of total price intervention
P_{NA} = Consumer price index of non-food sector
P_{NA}^* = Consumer price index of non-food sector in the absence of total price intervention (Cf. the footnote of Table 10-2)
α_A = Share of product A in the consumer price index busket

Table 17b. Direct and Total Real Transfers due to Value-Added and Non-Allocatable Input Price Interventions out of(-) and into(+) Agriculture(in billions units of Korean currency of 1980)

Year	Transfers on Value-Added[a/]											
	Rice		Barley		Soybean		Beef		Pork		All Products	
	Direct (1)	Total (2)	Direct (3)	Total (4)	Direct (5)	Total (6)	Direct (7)	Total (8)	Direct (9)	Total (10)	Direct (11)	Total (12)
1962	127.7	-425.2	34.0	-111.6	4.3	-17.1	.6	-12.5	16.9	-6.1	183.5	-572.5
63	657.7	-143.5	215.6	109.2	22.4	27.6	.8	-18.3	14.1	-8.9	910.6	-33.9
64	219.1	-552.4	147.3	-2.4	20.9	30.1	-11.5	-35.4	.2	-27.7	376.0	-587.8
65	-76.8	-575.9	77.8	-20.9	15.9	23.4	-1.0	-16.0	9.1	-4.5	25.0	-593.9
66	19.1	-869.5	-102.5	-397.4	18.8	27.8	-.7	-31.4	3.2	-46.9	-62.1	-1317.4
67	-48.3	-622.5	-58.2	-239.0	44.0	23.7	10.4	-10.0	22.5	3.9	-29.6	-843.9
68	99.6	-413.4	34.4	-122.1	17.3	-8.8	23.9	.7	43.5	30.4	218.7	-513.2
69	235.1	-404.3	84.2	-44.4	23.6	5.6	17.1	-4.4	20.9	-1.0	380.9	-448.5
70	250.4	-287.6	17.7	-117.8	45.4	24.9	19.4	-3.3	39.8	23.7	372.7	-360.1
71	615.6	151.7	133.2	25.9	24.2	13.2	21.5	-6.9	51.0	33.2	845.5	217.1
72	862.4	558.6	196.6	121.6	34.3	19.2	30.9	9.9	26.0	9.4	1150.2	718.7
73	175.6	-101.0	67.4	-17.7	24.0	7.8	18.3	-6.3	51.4	38.4	336.7	-78.8
74	40.2	-773.7	-15.3	-153.8	27.1	-8.6	24.2	-7.9	10.3	-20.6	86.5	-964.6
75	221.5	-511.7	-34.5	-214.4	32.3	3.7	32.1	-1.3	46.2	19.1	297.6	-704.6
76	1292.8	995.1	74.4	-3.7	56.5	41.3	98.1	77.3	72.0	52.7	1593.8	1162.7
77	1657.3	1470.3	128.7	109.8	78.7	65.4	147.3	133.5	67.6	50.1	2079.6	1829.1
78	1335.9	1129.4	238.2	214.4	85.4	77.8	219.6	211.9	61.1	34.0	1940.2	1667.5
79	1932.5	1690.7	281.7	242.8	30.5	19.3	168.8	145.8	-29.6	-89.7	2383.9	2008.9
80	1111.6	911.5	124.7	97.0	72.5	64.1	127.8	93.8	30.3	-24.8	1466.9	1141.6
81	1378.7	1124.6	109.8	82.8	110.1	101.3	153.8	134.0	-161.6	-63.4	1590.8	1379.3
82	1289.5	1107.3	135.6	123.2	91.1	86.7	187.4	177.8	-88.0	-150.4	1615.6	1344.6
83	1100.6	963.0	151.3	142.0	94.9	91.6	207.5	199.5	-52.8	17.3	1501.5	1413.4
84	1073.9	920.7	113.6	102.1	99.8	94.4	274.7	266.4	3.7	-27.5	1565.7	1356.1

Table 17b. Con'd

Year	Transfers on Purchased Inputs Not Allocatable						Sum of Transfers on All Product and Input Prices		Sum of Transfers as a Share of GDP_A	
	Other Inputs		Credit		All Inputs					
	Direct (13)	Total (14)	Direct (15)	Total (16)	Direct (17)	Total (18)	Direct (11)+(17) (19)	Total (12)+(18) (20)	Direct (21)(%)	Total (22)(%)
1962	-7.1	-34.4	20.5	15.0	13.4	-19.4	196.9	-591.9	11.0	-33.2
63	1.9	44.1	44.6	32.2	46.5	-11.9	957.1	-45.8	38.4	-1.8
64	-.3	-42.7	64.5	51.4	64.2	8.7	440.2	-579.1	15.0	-19.7
65	-10.5	-22.5	18.6	15.8	8.1	-8.1	33.1	-600.6	1.4	-25.9
66	14.1	-23.6	12.8	11.2	-1.3	-12.4	-63.4	-1329.8	-2.6	-54.7
67	-8.6	-13.3	9.1	8.0	.5	-5.3	-29.1	-849.2	-1.2	-36.1
68	-5.8	-16.8	12.8	11.1	7.0	-5.7	225.7	-518.9	8.8	-20.3
69	-7.0	-24.3	14.5	12.7	7.5	-11.6	388.4	-460.1	13.3	-15.8
70	-8.9	-18.8	28.1	25.1	19.2	6.3	391.9	-353.8	13.0	-11.8
71	.7	-14.4	29.3	26.2	30.0	11.8	875.5	228.9	26.5	6.9
72	6.8	3.5	49.4	47.5	56.2	51.0	1206.4	769.7	33.4	21.3
73	-1.6	-4.8	30.5	30.0	28.9	25.2	365.6	-53.6	10.4	-1.5
74	-2.7	-24.5	155.1	141.9	152.4	117.4	238.9	-847.2	5.0	-17.7
75	-3.4	-19.7	122.3	113.8	118.9	94.1	416.5	-610.5	8.2	-12.0
76	6.1	7.8	59.9	59.8	66.0	67.6	1659.8	1230.3	28.5	21.1
77	15.3	21.8	48.8	49.4	64.1	71.2	2143.7	1900.3	34.5	30.6
78	8.8	6.4	70.8	69.9	79.6	76.3	2019.8	1743.8	29.9	25.8
79	19.4	4.1	143.1	137.3	162.5	141.4	2546.4	2150.3	38.0	32.1
80	21.2	21.2	310.1	296.1	331.3	317.3	1798.2	1458.9	37.0	30.0
81	13.6	12.2	141.2	137.8	154.8	150.0	1745.6	1529.3	31.6	27.7
82	11.8	6.8	9.2	9.1	21.0	15.9	1636.6	1360.6	30.3	25.2
83	7.5	5.8	-8.4	-8.3	-.9	-2.5	1500.6	1410.9	27.1	25.4
84	1.6	2.4	16.1	16.1	17.7	18.5	1583.4	1374.6	26.3	22.8

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues
_____, The Cost of Production Survey, various issues
_____, Farm Household Economy Survey, various issues
National Agricultural Cooperatives Ferderation, The Rural Price and Wage Survey, various issues
_____, Fertilizer yearbook, various issues
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues
Economic Planning Board, The Summary of Government Budget, various issues
_____, Consumer Price Statistics Yearbook, various issues
The Bank of Korea, The Price Survey, various issues
FAO, Trade Yearbook, various issues
And also see Appendix 46.

a/ The real direct and total transfers on value-added are defined as:

$$\text{Direct transfer} = (VA_A \times Q_A)/CPI - (VA'_A \times Q_A)/CPI'$$

$$\text{Total transfer} = (VA_A \times Q_A)/CPI - (VA^*_A \times Q_A)/CPI^*$$

where VA_A = Value-added of product A
VA'_A = Value-added of product A in the absence of direct price intervention
VA^*_A = Value-added of product A in the absence of total price intervention
Q_A = Output of product A
CPI = Consumer price index(1980 = 100.0)
CPI' = Consumer price index in the ansence of direct price intervention
CPI* = Consumer price index in the absence of total price intervention

Table 17c. Real Transfers into(+)/out of(-) Agriculture
(in billions of units of Korean currency of 1980)

Year	Non-Price Transfers										Price-Related Transfers		Total of Price-Related & Non-Price Trasfers		Total as a Share of GDP_A	
	Tax & Misc. Charges		Public Investment		Research & Extension		Others		Sub-Total							
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(9)+(11) (13)	(10)+(12) (14)	(%) (15)	(%) (16)
1962	-49.3	-36.0	94.5	69.0	5.5	4.0	-	-	50.7	37.0	196.9	-591.9	247.6	-554.9	13.9	-31.1
63	-56.6	-40.9	54.2	39.1	6.0	4.3	-	-	3.6	2.6	957.1	-45.8	960.7	-43.2	38.5	-1.7
64	-60.9	-48.6	34.5	27.5	6.4	5.1	-	-	-20.0	-15.9	440.2	-579.1	420.2	-595.0	14.3	-20.2
65	-59.7	-50.7	47.3	40.1	6.2	5.3	-	-	-6.2	-5.3	33.1	-600.6	26.9	-605.9	1.2	-26.2
66	-57.0	-50.0	88.6	77.6	6.7	5.9	-	-	38.3	33.5	-63.4	-1329.8	-25.1	-1296.3	-1.0	-53.3
67	-41.2	-36.4	73.9	65.2	6.7	5.9	-	-	39.4	34.8	-29.1	-849.2	10.3	-814.4	.4	-34.7
68	-43.3	-37.5	137.8	119.2	8.3	7.2	-	-	102.8	88.9	225.7	-518.9	328.5	-430.0	12.8	-16.8
69	-55.0	-48.2	210.0	184.2	10.0	8.8	-	-	165.0	144.7	388.4	-460.1	553.4	-315.4	19.0	-10.8
70	-36.0	-32.2	207.0	185.1	7.5	6.7	-	-	178.5	159.6	391.9	-353.8	570.4	-194.2	18.9	-6.5
71	-41.0	-36.6	224.9	200.7	20.1	17.9	6.8	6.1	210.8	188.2	875.5	228.9	1086.3	417.1	32.8	12.6
72	-38.7	-37.2	216.6	208.2	14.4	13.8	41.0	39.4	233.2	224.1	1206.4	769.7	1439.6	993.8	39.9	27.5
73	-53.2	-52.3	194.9	191.7	12.2	12.0	26.1	25.7	180.0	177.0	365.6	-53.6	545.6	123.4	15.6	3.5
74	-57.0	-52.1	193.4	176.9	13.7	12.5	38.1	34.8	188.2	172.2	238.9	-847.2	427.1	-675.0	8.9	-14.1
75	-66.8	-62.1	269.0	250.2	12.6	11.7	39.6	36.8	254.4	236.6	416.5	-610.5	670.9	-373.9	13.1	-7.3
76	-92.3	-92.1	335.6	334.9	19.6	19.6	51.8	51.7	314.8	314.1	1659.8	1230.3	1974.6	1544.4	33.9	26.5
77	-115.1	-116.7	342.4	345.0	20.0	20.1	64.7	65.5	312.0	316.1	2143.7	1900.3	2455.7	2216.4	39.6	35.7
78	-112.3	-110.9	376.5	371.8	20.8	20.5	60.5	59.8	345.5	341.2	2019.8	1743.8	2365.3	2085.0	35.0	30.8
79	-138.0	-132.4	421.0	403.9	23.0	22.1	93.9	90.1	399.9	383.7	2546.4	2150.3	2946.3	2534.0	44.0	37.8
80	-138.7	-132.4	368.4	351.7	19.8	18.9	72.6	69.3	322.1	307.5	1798.2	1458.9	2120.3	1766.4	43.7	36.4
81	-124.1	-121.2	484.5	472.9	18.2	17.8	79.8	77.9	458.3	447.4	1745.6	1529.3	2203.9	1976.7	39.9	35.8
82	-116.9	-114.5	452.3	443.3	20.0	19.6	58.3	57.2	413.8	405.6	1636.6	1360.5	2050.4	1766.1	38.0	32.7
83	-121.1	-120.0	419.2	415.3	21.3	21.1	192.7	190.9	512.2	507.4	1500.6	1410.9	2012.8	1918.3	36.3	34.6
84	-121.0	-120.6	445.7	444.4	19.7	19.7	185.3	184.7	529.7	528.1	1583.4	1374.6	2113.1	1902.7	35.1	31.6

Source: Economic Planning Board, The Summary of Government Budget, various issues
_____, Consumer Price Statistics, various issues
And also see Tables 17a, 17b and Appendix 46.

Chapter 7

INCOME DISTRIBUTION EFFECT OF INTERVENTION

Our interest here is income distribution between small and large farms and between low- and high-income groups in urban areas. Although the same price is applied, the relative benefit or loss due to changes in relative prices differs between farms of different sizes and among different urban income groups.

We consider here three three different categories of the distributional effect of price policies; that is, the instantaneous effect (at $t=t_0$), the short-run effect (at $t=t_0 + 1$), and the long-run effect ($t > t_0 + 1$). each for the case of direct price intervention (with the border price evaluated at the nominal exchange rate) and for the case of total price intervention (with the border price evaluated at the free-trade equilibrium exchange rate). The instantaneous distributional effect refers to the case where the quantity produced (or the quantity consumed) stays constant despite price changes. In actuality, however, changes in the price of products and inputs affect the quantity of farm output and input use as well as the quantity consumed by the urban population. The short-run distributional effect is where the impacts of changes in farm output, input use, and consumption are reflected in a one-year time lag, whereas the long-run

effects are these effects accumulated over time.[10/]

In all three cases, the distributional effects are measured in terms of the proportional change in real income of each farm and urban group due to price intervention. The necessary information on income and expenditure were obtained from the Farm Household Economy Survey (1962-84) and the Urban Household Living Expenditure Survey (1962-84). Farm producers are classified on the basis of size of farm; small-scale farm (less than 0.5 ha); medium-scale farm (0.5 - 1.5 ha); and large-scale farm (with 1.5 ha or more).[11/]

Urban households are also classified into three groups, based on income; lowest 3 deciles as the low-income group, middle 4 deciles as the middle-income group, and highest 3 deciles as the high-income group.

The results of our measurement are presented in Tables 18-21. Table 18 represents the real income effect in rural area of direct intervention and Table 19 that of total intervention. Table 20 gives the real income effect in urban areas of direct intervention and Table 21 that of total intervention.

10/ Changes in agricultural prices affect shifts in the supply function and thereby influenced the factor prices of other commodities and wages as well. In order to capture the effects of price intervention on wages, an attempt was made to estimate the wage functions both for rural and urban areas by means of general equilibrium analyses. But the estimated results were not satisfactory, and are not presented here.

11/ Not all large farms have large sales, and not all farms with large sales are large-size farms. Even for judging the relative distribution of benefits, therefore, farms must be classified by income class, not by acreage class. But due to limited data availability, the present study had to rely on classification by acreage class.

Effects of Price Support on Producer Income

Korean agriculture has been increasingly protected since the early 1970s. For instance, the nominal protection rate for rice rose from 14.5 percent in 1962 to 65.2 percent in 1984, while those for barley, soybeans, and beef rose from 16.9, 15.3, and 4.4 percent to 88.9, 236.7, and 170.6 percent, respectively (see Table 8-2). The real protection rate for rice rose from (-)29.2 percent in 1962 to 52.9 percent in 1984, while those for barley, soybeans, and beef rose from (-)27.7, (-)28.6, and (-)35.4 percent to 74.8, 211.5 and 150.3 percent over the same period (see Table 10-2). The benefits of protection are measured in terms of the proportional changes in real income that farmers gain beyond what they would have received in the absence of protection. Large farms normally produce more and sell a larger portion of what they produce than do small farms. Hence, the distribution of price support benefits tends to be more heavily concentrated among large farms. The results presented in Table 18 and 19 support this hypothesis.

To take the distributional effects of direct intervention as an example, the instantaneous benefit gained by small farmers in 1962 was 14.5 percent, whereas that for large farmers was 29.8 percent.

The difference in the absolute gain in real income (1980 prices) was even greater. The net increase in real income for small farmers was 73,900 won per household, while that for large farmers was 340,000 won, more than four times as much. Over time, the instantaneous distributional impact has become greater as producer prices have been

increasingly subsidized. The relative net benefit the small farmer received in 1984 was 18.3 percent, or 436,100 won per household,; that for the large farmer was 44.5 percent, or 1,708,200 won.

If the overvaluation of the exchange rate is taken into account, the impact on the distribution of income shows a different pattern. As shown in Table 19, the distributional effects were negative in most years of the 1960s for small and medium farmers, and negative in all years for large farmers. In those years the rate of exchange rate overvaluation was exceedingly high. In the early 1970s the distributional impact became positive for all three groups. By 1984, small farmers gained 14.9 percent and large farmers 38.4 percent in terms of real income.

Both the short-run and the long-run distributional effects, with changes in output and quantity of purchased inputs taken into account, display a similar pattern of differences in real income gains. The effect is much greater in percentage and absolute terms on larger farms than smaller farms, resulting in a worsening of income distribution within agriculture. Moreover, the smallest farms may be hurt by price support programs which aim at maintaining domestic market prices higher than international market prices because many farmers with small holdings are net purchasers of food during the off season. Insofar as small farmers purchase for cash, agricultural price supports affect them primarily as consumers, causing a decline in real income.

Table 18. Real Income Effect in Rural Area of Direct Intervention [a/]

Year	A) Instantaneous			B) Short-Run			C) Cumulative		
	small-scale farmers less than 0.5ha	medium-scale farmers 0.5ha - 1.5ha	large-scale farmers more than 1.5ha	small-scale farmers less than 0.5ha	medium-scale farmers 0.5ha - 1.5ha	large-scale farmers more than 1.5ha	small-scale farmers less than 0.5ha	medium-scale farmers 0.5ha - 1.5ha	large-scale farmers more than 1.5ha
1962	.145	.229	.298	.187	.294	.410	.123	.171	.200
63	.083	.139	.180	.119	.201	.254	.138	.231	.289
64	.143	.233	.274	.185	.309	.377	.221	.372	.453
65	.160	.221	.260	.196	.277	.347	.229	.345	.442
66	.052	.053	.029	.057	.060	.037	.109	.134	.128
67	.020	.017	.006	.015	.015	.010	.060	.075	.061
68	.008	.027	.030	.074	.167	.256	.085	.070	.083
69	.055	.099	.118	.066	.121	.157	.081	.143	.179
70	.058	.103	.122	.075	.133	.179	.091	.158	.208
71	.105	.216	.262	.138	.279	.358	.146	.300	.385
72	.136	.318	.401	.188	.427	.574	.163	.523	.705
73	.244	.434	.571	.134	.528	.757	.322	.602	.870
74	.243	.358	.403	.283	.430	.503	.329	.510	.602
75	.081	.108	.109	.093	.128	.144	.151	.217	.248
76	.055	.139	.162	.084	.191	.242	.117	.261	.301
77	.106	.033	.416	.206	.576	.913	.156	.432	.647
78	.202	.419	.618	.250	.578	.871	.242	.533	.882
79	.169	.450	.696	.202	.541	.876	.207	.550	.909
80	.146	.412	.613	.168	.481	.744	.161	.462	.737
81	.132	.438	.757	.154	.510	.938	.145	.484	.921
82	.149	.398	.583	.179	.477	.772	.159	.452	.758
83	.176	.276	.485	.210	.330	.653	.194	.295	.628
84	.183	.331	.445	.213	.402	.584	.172	.394	.629

Source: Ministry of Agriculture and Fisheries, The Farm Household Economy Survey, various issues
The Bank of Korea, The Price Survey, various issues
National Agricultural Cooperatives Federation, The Rural Price and Wage Survey, various issues
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues
Rural Development Administration, Standard Incomes of Crops and Livestock, various issues
And also see Tables 8-2, 8'-2, 13a, 13b and 13e.

a/ The proportional change in real income of each group of farmers due to direct price intervention is calculated as follows:

$$\hat{y}_D = (y-y')/y'$$

$$y = (Y_F+Y_{NF})/(\Sigma \alpha_i P_i^c+(1-\Sigma \alpha_i)P_{NA})$$

$$y' = (Y_F'+Y_{NF})/(\Sigma \alpha_i P_i^{c'}+(1-\Sigma \alpha_i)P_{NA})$$

$$Y_F = \sum_i (P_i-\Sigma_j a_{ij}P_j)Q_i$$

$$Y_F' = \sum_i (P_i'-\Sigma_j a_{ij}P_j')Q_i'$$

where $\hat{y}_D$ = proportional change in real income due to direct price intervention
y = real income
y' = real income in the absence of direct price intervention
Y_F = nominal farm income
Y_F' = nominal farm income in the absence of direct price intervention
Y_{NF} = nominal off-farm income
P_i = output price of product i
P_i' = output price of product i in the absence of direct price intervention
P_i^c = consumer price index of product i
$P_i^{c'}$ = consumer price index of product i in the absence of direct price intervention
P_{NA} = consumer price index of nonagricultural sector
P_j = price of input j
P_j' = price of input j in the absence of direct price intervention
Q_i = output of product i
Q_i' = output of product i in the absence of direct price intervention
α_i = share of product i in household budget
a_{ij} = technical coefficient

Figure 13

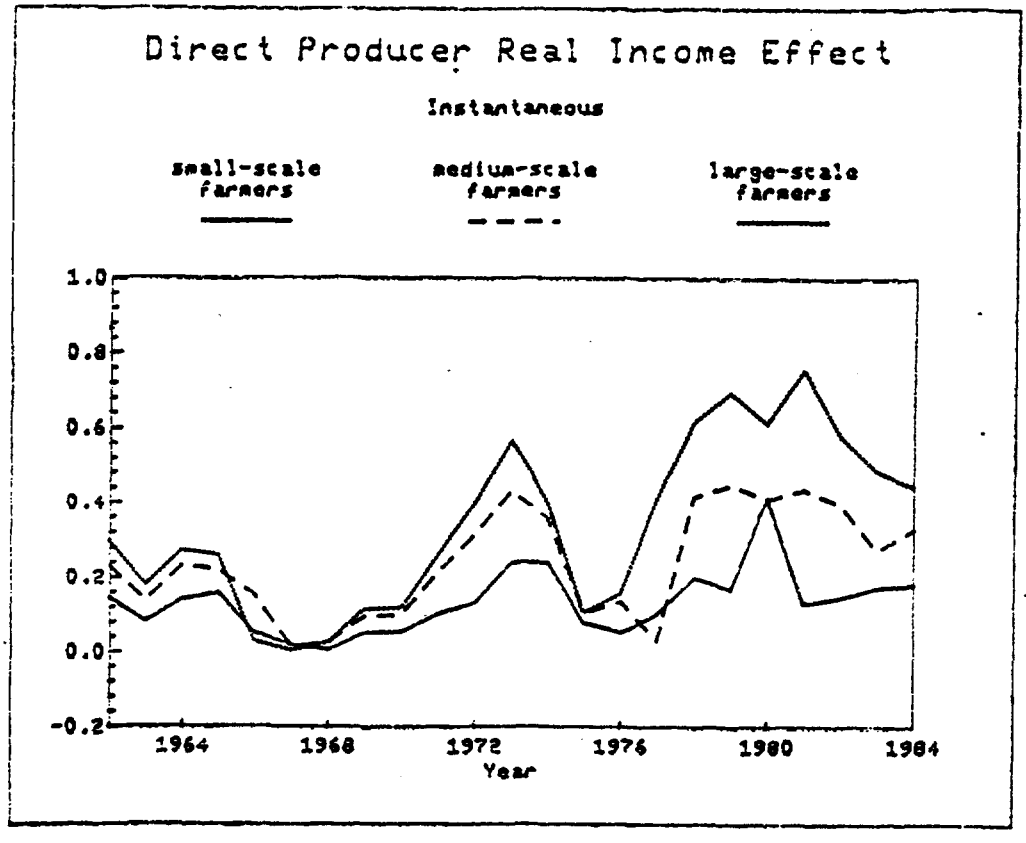

Direct Producer Real Income Effect
Instantaneous
small-scale farmers
medium-scale farmers
large-scale farmers
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
1964
1968
1972
1976
1980
1984
Year

Figure 14

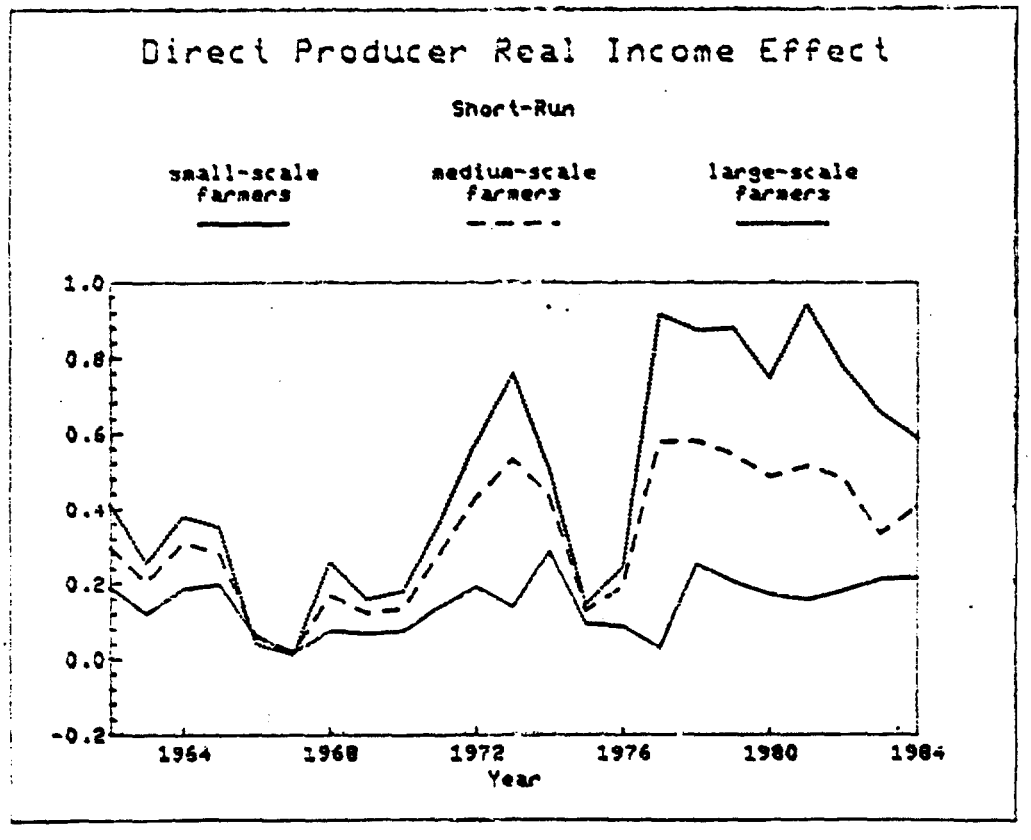

Direct Producer Real Income Effect
Short-Run
small-scale farmers
medium-scale farmers
large-scale farmers
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
1964
1968
1972
1976
1980
1984
Year

Figure 15

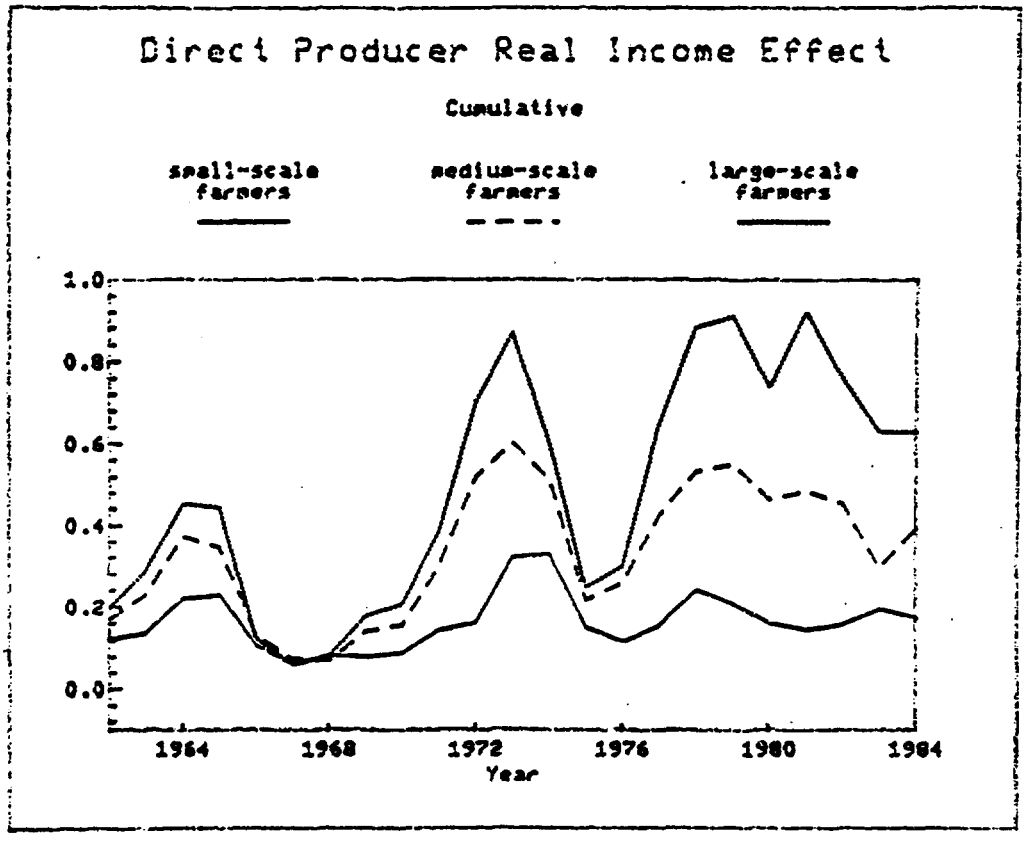

Direct Producer Real Income Effect
Cumulative
small-scale farmers
medium-scale farmers
large-scale farmers
1.0
0.8
0.6
0.4
0.2
0.0
1964
1968
1972
1976
1980
1984
Year

Table 19. Real Income Effect in Rural Area of Total Intervention[a/]

Year	a) Instantaneous			B) Short-Run			C) Cumulative		
	small-scale farmers	medium-scale farmers	large-scale farmers	small-scale farmers	medium-scale farmers	large-scale farmers	small-scale farmers	medium-scale farmers	large-scale farmers
	less than 0.5ha	0.5ha - 1.5ha	more than 1.5ha	less than 0.5ha	0.5ha - 1.5ha	more than 1.5ha	less than 0.5ha	0.5ha - 1.5ha	more than 1.5ha
1962	.156	.028	-.058	.113	-.019	-.114	.113	-.019	-.114
63	.133	.014	-.022	.121	-.006	-.046	.101	-.031	-.074
64	.008	-.122	-.184	-.014	-.152	-.217	-.026	-.170	-.238
65	.008	-.111	-.198	-.011	-.136	-.228	-.030	-.162	-.257
66	-.055	-.191	-.260	-.095	-.241	-.313	-.119	-.270	-.341
67	-.175	-.219	-.283	-.141	-.287	-.349	-.167	-.318	-.383
68	-.082	-.210	-.280	-.134	-.271	-.341	-.182	-.322	-.390
69	-.044	-.161	-.193	-.082	-.210	-.285	-.141	-.274	-.345
70	.055	.004	-.013	-.034	-.134	-.189	-.096	-.204	-.252
71	.033	-.014	-.033	.025	-.023	-.044	-.020	-.079	-.101
72	.038	.086	.122	.060	.120	.163	.038	.089	.129
73	.092	.127	.147	.117	.167	.196	.115	.165	.198
74	.246	.261	.256	.280	.315	.320	.271	.300	.300
75	.052	-.004	-.043	.032	-.033	-.076	.044	-.016	-.058
76	-.041	-.025	-.011	-.042	-.024	-.006	-.041	-.024	-.007
77	.044	.185	.281	.074	.251	.376	.077	.259	.386
78	.196	.393	.600	.236	.481	.751	.249	.509	.800
79	.204	.465	.683	.236	.536	.824	.252	.575	.888
80	.174	.384	.554	.195	.440	.646	.214	.487	.721
81	.123	.346	.593	.142	.400	.645	.161	.456	.760
82	.120	.300	.460	.138	.350	.549	.159	.404	.641
83	.135	.216	.406	.154	.253	.490	.170	.282	.561
84	.149	.275	.384	.168	.343	.469	.179	.368	.540

Source: Ministry of Agriculture and Fisheries, The Farm Household Economy Survey, various issues
The Bank of Korea, The Price Survey, various issues
National Agricultural Cooperatives Federation, The Rural Price and Wage Survey, various issues
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues
Rural Development Administration, Standard Incomes of Crops and Livestock , various issues
And also see Tables 10-2, 10'-2, 13c, 13d and 13f.

a/ The proportional change in real income of each group of farmers due to total price intervention is calculated as follows:

$$\hat{y}_T = (y-y^*)/y^*$$

$$y = (Y_F+Y_{NF})/(\Sigma\alpha_i P_i^c + (1-\Sigma\alpha_i)P_{NA})$$

$$y^* = (Y_F^*+Y_{NF})/(\Sigma\alpha_i P_i^{c*} + (1-\Sigma\alpha_i)P_{NA}^*)$$

$$Y_F = \sum_i (P_i - \sum_j a_{ij}P_j)Q_i$$

$$Y_F^* = \sum_i (P_i^* - \sum_j a_{ij}P_j^*)Q_i^*$$

where $\hat{y}_T$ = proportional change in real income due to total price intervention

y = real income

y^* = real income in the absence of total price intervention

Y_F = nominal farm income

Y_F^* = nominal farm income in the absence of total price intervention

Y_{NF} = nomonal off-farm income

Y_{NF}^* = nominal off-farm income in the absence of total price intervention

P_i = output price of product i

P_i^* = output price of product i in the absence of total price intervention

P_i^c = consumer price index of product i

P_i^{c*} = consumer price index of product i in the absence of total price intervention

P_{NA} = consumer price index of nonagricultural sector

P_{NA}^* = consumer price index of nonagricultural sector in the absence of total price intervention

P_j = price of input j

P_j^* = price of input j in the absence of total price intervention

Q_i = output of product i

Q_i^* = output of product i in the absence of total price intervention

α_i = share of product i in household budget

a_{ij} = technical coefficient

Figure 16

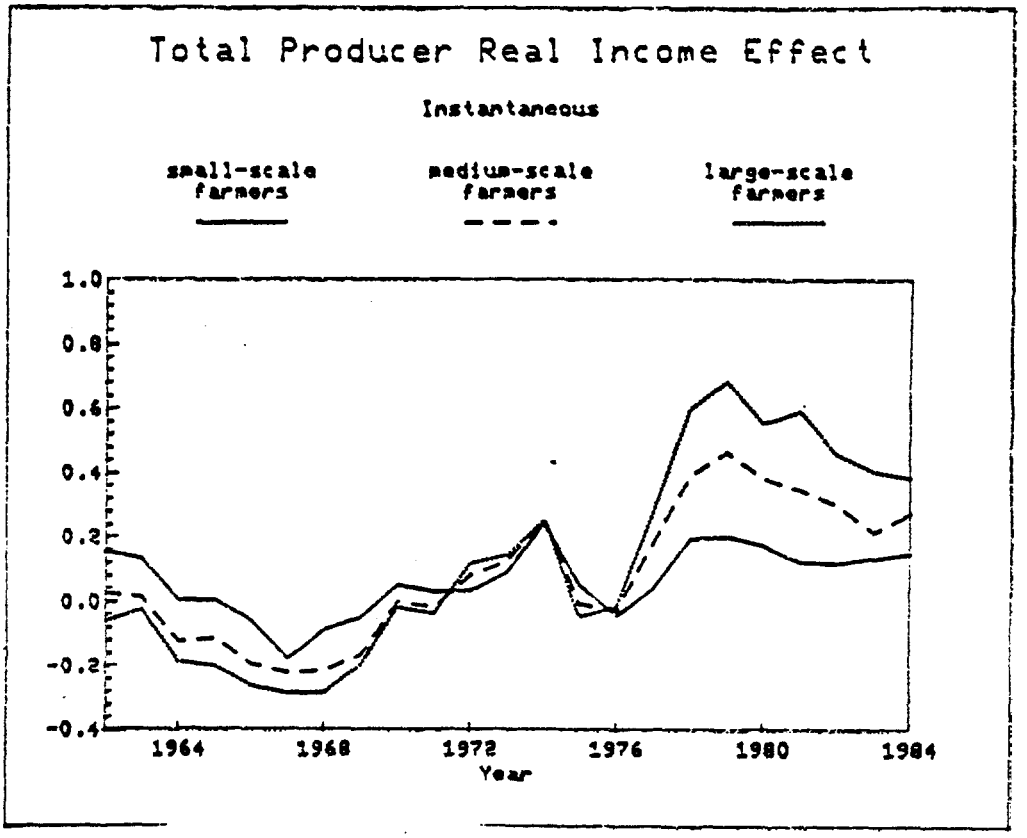

Total Producer Real Income Effect
Instantaneous
small-scale farmers
medium-scale farmers
large-scale farmers
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
1964
1968
1972
1976
1980
1984
Year

Figure 17

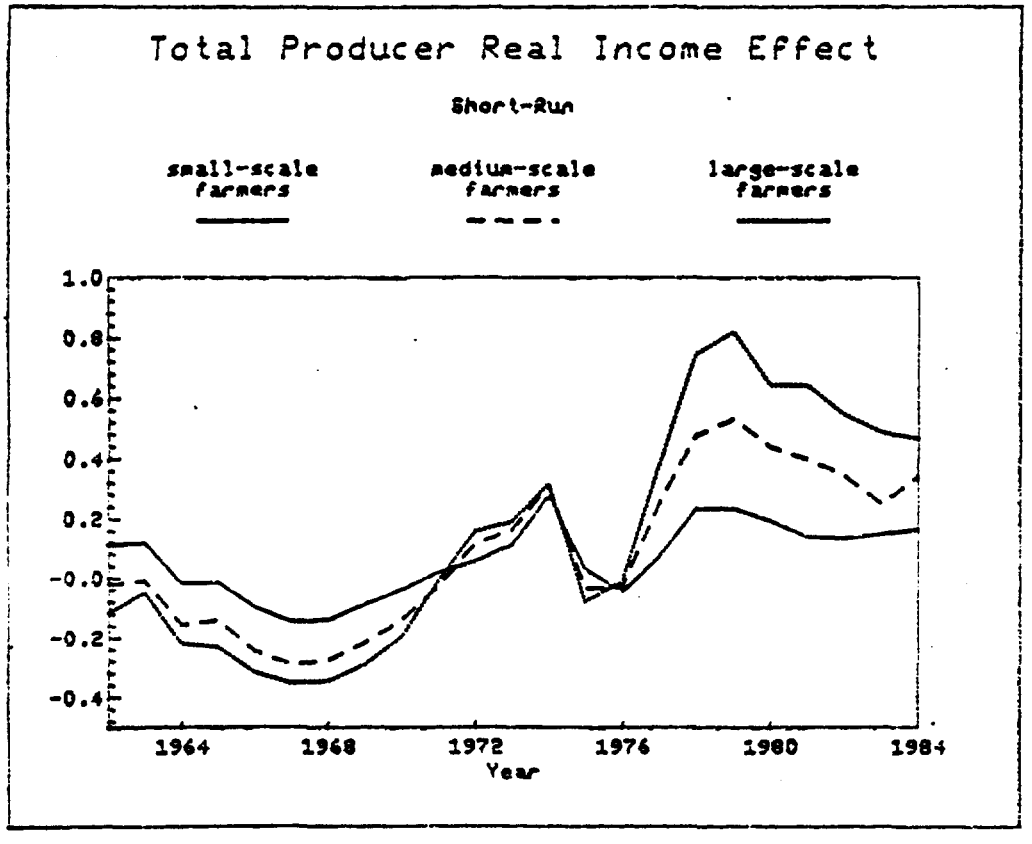
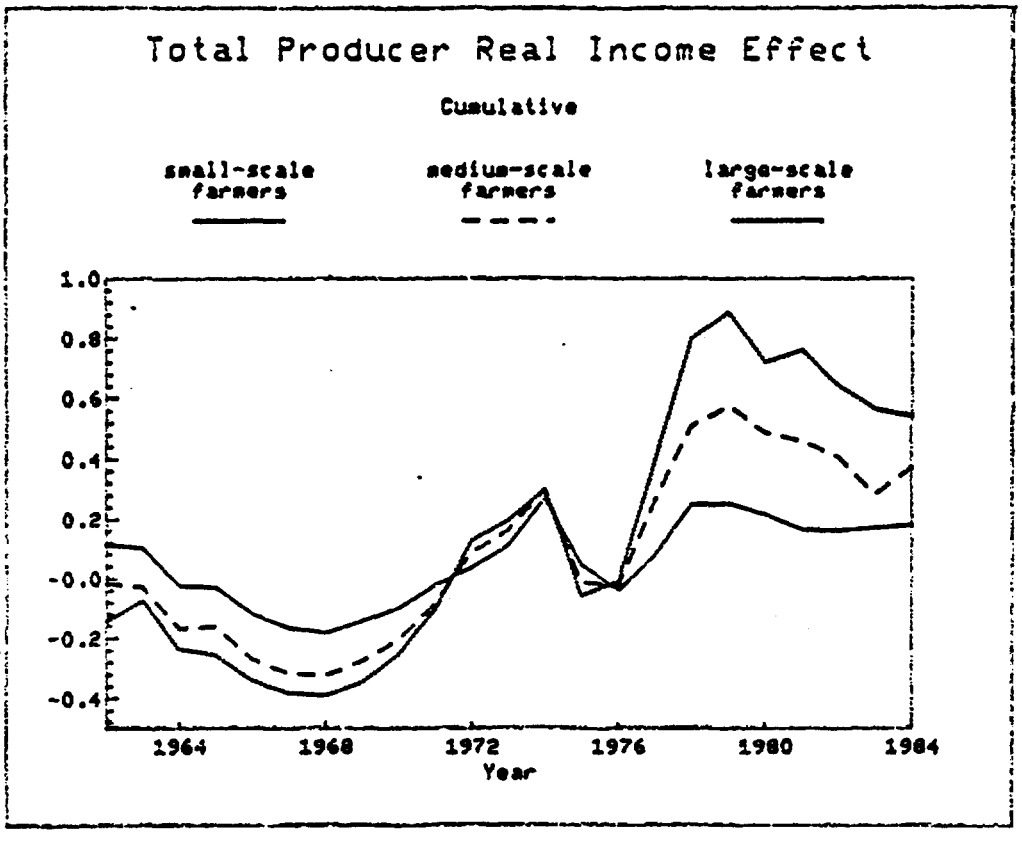

Total Producer Real Income Effect
Short-Run
small-scale farmers
medium-scale farmers
large-scale farmers
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
-0.4
1964
1968
1972
1976
1980
1984
Year

Figure 18


Total Producer Real Income Effect
Cumulative
small-scale farmers
medium-scale farmers
large-scale farmers
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
-0.4
1964
1968
1972
1976
1980
1984
Year

Effects of Price Support on Consumer Income

A roughly reverse situation arises in the case of urban consumers. Food prices affect urban consumers in proportion to the ratio of expenditure on food to income. Generally, lower-income urban consumers spend a much higher proportion of their incomes on food than do those with higher incomes.

According to the estimated results in Table 20, the instantaneous and short-run distributional effects of direct intervention (or nominal protection) resulted in reducing real income for all income groups in most years during 1962-84. Direct intervention alone in 1984 had the effect of reducing real income by 4.3 percent for the low-income group and by 2.2 percent for the high-income group.

When the effects of indirect intervention (i.e., exchange rate overvaluation) are added (Table 21), the distributional effect was to increase real income for all groups until the mid-1970s. This is because urban consumers consumed food at lower prices than would have prevailed in the absence of government intervention, especially intervention in exchange rates. After 1976, however, government intervention had the effect of reducing the real income of all urban consumers. In 1984, for example, direct and indirect intervention resulted in reducing the real income of the low-income group by 3.8 percent and that of the high-income group by 1.7 percent. But the incremental expenditure in terms of absolute amount is much larger for the high-income group because of a larger initial expenditure.

In summary, price support programs have tended to provide benefits primarily to larger farms and to high-income urban consumers. Conversely, a very large number of small farmers and urban lower income earners were helped relatively little by price supports.

As the Korean economy continues to grow, however, product lines will become increasingly diversified, and the pattern of consumption will undergo a substantial change. As the variety and volume of non-agricultural goods in the domestic market increases, the relative share of grain in household expenditure falls. The average share of rice in the cost of living was almost 20 percent in South Korea in 1975, but it had declined to 10 percent in 1984. It is expected to decline further as real income grows. Consequently, the distributional impact of agricultural price support policy on urban wage earners will be much smaller than on farm producers.

Table 20. Real Income Effect in Urban Area of Total Intervention[a/]

Year	Low Income Group	Middle Income Group	High Income Group
1962	.130	.080	.051
63	.084	.046	.022
64	.110	.071	.044
65	.089	.062	.030
66	.100	.060	.038
67	.104	.060	.034
68	.082	.049	.026
69	.068	.039	.023
70	.054	.030	.017
71	.012	.008	.004
72	-.039	-.024	-.020
73	.024	.013	.007
74	.104	.066	.041
75	.079	.049	.029
76	-.072	-.033	-.021
77	-.072	-.050	-.033
78	-.037	-.026	-.020
79	-.043	-.030	-.019
80	-.035	-.024	-.016
81	-.044	-.031	-.021
82	-.049	-.035	-.022
83	-.054	-.039	-.026
84	-.033	-.025	-.017

Source : Economic Planning Board, Consumer Price Statistics, various issues
_____, Urban Household Living Expenditures Survey, various issues
And also see Tables 10'-1 and 10'-2.

a/ $\dot{y}_{yT}^{k} = \frac{CPI_k^*}{CPI_k} - 1 = \frac{\Sigma\beta_i^k P_i^* + (1 - \Sigma\beta_i^k)P_{NA}^*}{CPI_k} - 1$

where $\dot{y}_{yT}^{k}$ = proportional change in real income of income group k due to total price intervention

CPI_k = consumer price index of income group k

CPI_k^* = consumer price index of income group k in the absence of total price intervention

P_k^* = consumer price index of product i in the absence of total price intervention

P_{NA}^* = consumer price index of nonagricultural sector in the absence of total price intervention

β_i^k = share of product i in household budget of income group k

Figure 19

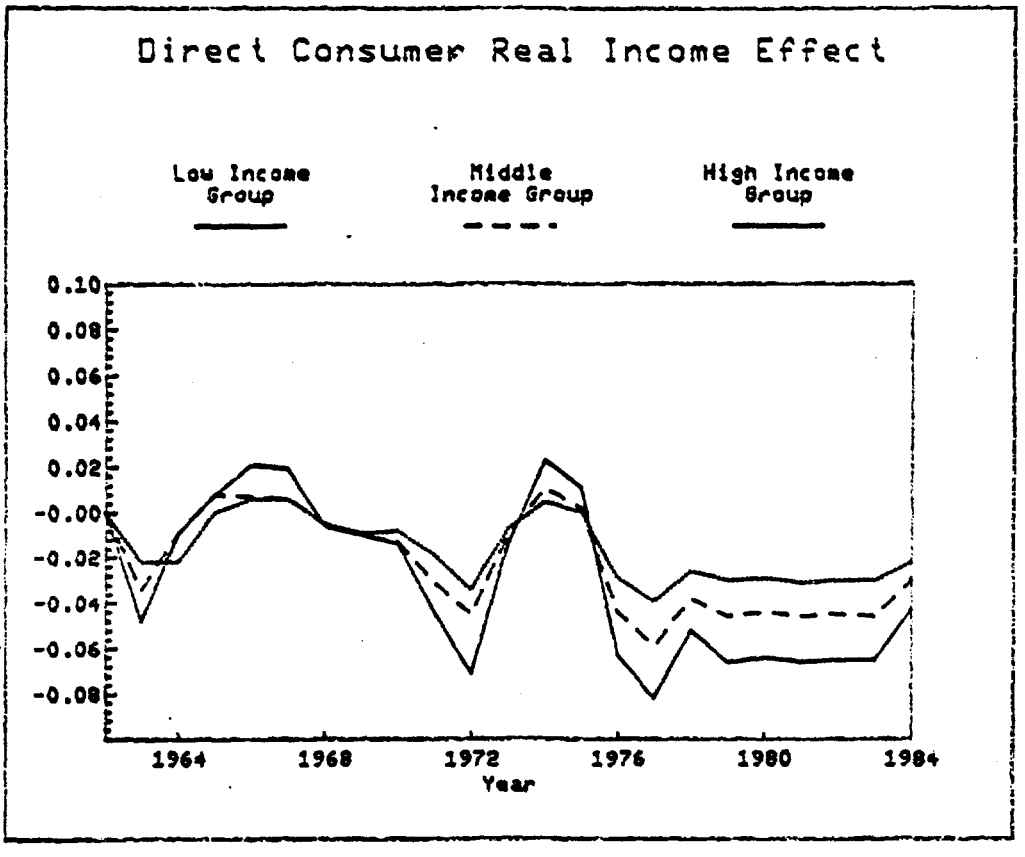
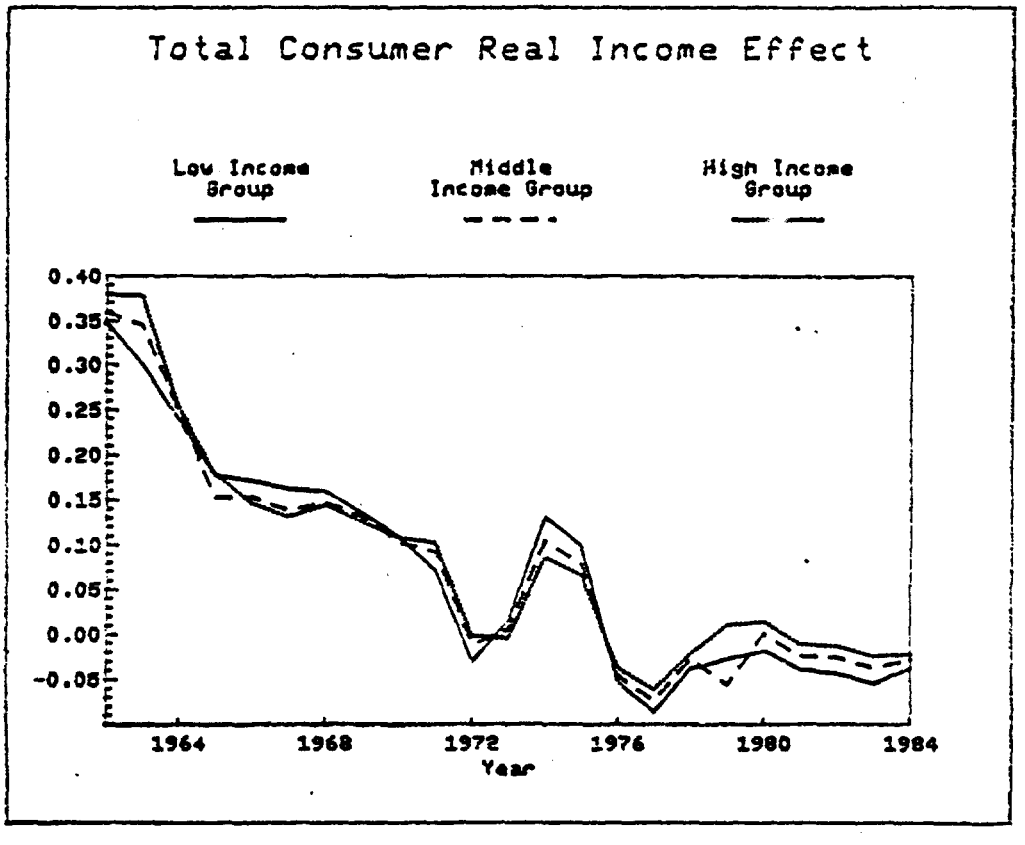


Figure 20



Chapter 8

RELATIVE PRICE VARIABILITY

A common argument for government intervention in agricultural prices is to prevent the transmission of world price variability to domestic prices. In order to evaluate the extent to which agricultural pricing policies in Korea have prevented the transmission of world price variability to domestic prices, the degree of domestic price variability in the absence of direct and total intervention was examined relative to actual price variability. The mean and variance were calculated for the respective relative price series of each product for the total period (1960-84) and for two sub-periods (1960-71, 1972-84). Since the conventional variance statistics may not reflect the frequency of change or the year-to-year fluctuation of prices, a Z-statistic based on the following formula was calculated as a supplement to the variance to examine the volatility in annual prices.

$$Z = \frac{\sum_{t=2}^{N} (P_t - P_{t-1})}{N-1}$$

where P_t = Product price in year t

t_o = Starting year of the sample period (1960)

N = Number of observations

In addition, the variances of annual per capita output and consumption, and simple correlation coefficients between domestic prices and quantities, were calculated. The results are shown in Table 22 and Table 23.

Relative Price Variability

The first three lines in Table 22 give the estimated means, variances, and Z-statistics of the producer price of rice under three alternative price scenarios: the domestic price, the border price evaluated at the official exchange rate, and the border price evaluated at the free trade equilibrium exchange rate. The next three lines give the respective means, variances, and Z-statistics of the consumer price of rice.

One can observe that the variance of the domestic producer price for 1960-84 was much higher than that of the corresponding border price evaluated at the official exchange rate and slightly higher than that of the border price evaluated at the equilibrium exchange rate, whereas the Z-statistic was the lowest, approximately 32 percent and 14 percent of the two respective border prices. To look at the corresponding statistics for the two subperiods (1960-71 and 1972-84), not only the variances but also the Z-statistics of the domestic price maintained successively the lowest level in contrast to the highest level for the entire period 1960-84.

What caused these differences in the estimated variability statistics between the entire period and the two subperiods? As already discussed in Chapter 2, government policy throughout the 1960s was

directed at stabilizing rice prices at a low level but shifted in the late 1960s toward maintaining rice prices at a high level. This results in the smaller variances and Z-statistics.

The variances and Z-statistics of the consumer price, calculated in lines 4-6, indicate approximately the same pattern of change as those of the producer prices. The variance of the domestic consumer price for the entire period was much higher than those of the two respective border prices, while the Z-statistic was the lowest. For the 1960-71 period, however, both the variance and Z-statistics of the domestic consumer price were only slightly higher than the two corresponding border prices, and for the 1972-84 period they were much lower than those of the two respective border prices. These differences in magnitude of the estimated variability statistics between the entire period and the subperiods can be explained by the same reasoning applied to producer rice prices. It is also to be noted that both the variances and Z-statistics of the border price evaluated at the equilibrium exchange rate tend to be much higher than those of the border price evaluated at the official exchange rate. This is mainly ascribable to larger year-to-year fluctuation of the equilibrium exchange rate when compared with that of the official exchange rate.

Lines 7-9 provide the estimated mean, variances, and Z-statistics of the producer price of barley, and lines 10-12 the corresponding variability statistics of the consumer price of barley under the three alternative price scenarios. The variance of the domestic producer price for the entire period was much larger than that

of the border price evaluated at the official exchange rate but substantially lower than that of the border price evaluated at the equilibrium exchange rate. The Z-statistics, on the other hand, reveal the least year-to-year fluctuation for the entire period. For 1960-71, both the variance and the Z-statistics of the domestic producer price were about the same in magnitude as those of the border price evaluated at the official exchange rate but much higher than those of the border price evaluated at the equilibrium exchange rate. For 1972-84, both the variance and the Z-statistics were the lowest, resulting in a pattern of variability similar to that of the producer price of rice.

In the case of the consumer price of barley, the domestic price shows the lowest variances and Z-value for the two subperiods as well as for the entire period. This largely reflects government policy efforts to maintain the barley consumer price at a stable level through consumer subsidization, irrespective of international price changes.

Changes in the annual relative producer price of soybeans under the alternative price scenarios are summarized in lines 13-15, and those in the consumer price in the lines 16-18. Both the variance and the Z-value of the domestic producer price indicate the highest degree of variation not only for the entire period but also for the two subperiods. Notwithstanding Korea's heavy dependency on imports, changes in the domestic market price were largely insulated from changes in the world market price.

Lines 19-21 show the estimated means, variances, and Z-statistics of the producer price of beef, and lines 22-24 the

corresponding three variability statistics of the consumer price. Noticeable for beef prices is that the differences in the magnitude of variability among different price scenarios are unusually large, both for the entire period and the subperiods. The variance of the domestic producer price for the entire period was about 11 times and 30 times as large as those of the two respective border prices, and the Z-statistics were 4.5 times and 2.8 times as large as those of the two border prices. For 1960-71, however, the Z-statistic of the domestic producer price was substantially lower than that of the two border prices, while the variance was higher relative to those of the two border prices. For 1972-84, the two variability statistics revealed about the same order of magnitude as for the entire period. As for the consumer price of beef, the variance and the Z-value of the domestic price were the highest for the entire period and for the two subperiods, with the exception of the 1960-71 period, when the Z-statistic of the border price evaluated at the equilibrium exchange rate was the highest.

Lines 25-27 present the three corresponding variability statistics for the three respective producer prices of pork, and lines 28-38 those for the consumer prices of pork. A comparison of the variances for the entire period indicates that the degree of variability in the domestic producer price was close to those in the border prices evaluated at the official and equilibrium exchange rates. The corresponding Z-value indicates that the year-to-year changes in the domestic prices were slightly greater than that for the border price evaluated at the official exchange rate but smaller than that for the

border price evaluated at the equilibrium exchange rate. For 1960-71, both the variance and the Z-value of the border price evaluated at the official exchange rate were the lowest. For 1972-84, the variance of the domestic price was the smallest, whereas the Z-value was the largest for the border price evaluated at the official exchange rate.

In the case of the consumer price for the entire period, the domestic price displayed the least year-to-year fluctuation, while it recorded a higher degree of variability when measured in terms of variance. For 1960-71 the domestic price recorded the highest degree of variability in terms of variance but the lowest degree of variability in terms of Z-statistics or in terms of year-to-year fluctuation. For 1972-84, both the variance and the Z-statistics were the lowest of the three alternative price scenarios.

Output and Consumption Variability

Table 23 provides a comparison between the variance of per capita output and that of per capita consumption for each product.

For rice, the variance of per capita consumption exceeded that of per capita output for both the entire period and the two subperiods, reflecting relative stability of consumption compared with production. This stability of consumption relative to output is mainly due to the government's discretionary policy of filling the demand-supply gap by importation or from the existing stock of rice.

For barley, the degree of variability in per capita output was higher than that in per capita consumption for the entire period and for 1960-71, while that in per capita consumption recorded higher

Table 22. Mean, Variance and Z-statistics[1/] of Major Agricultural Prices

Prices		1960-84			1960-71			1972-84		
		Mean	Variance	Z-stat.	Mean	Variance	Z-stat.	Mean	Variance	Z-stat.
Rice	$P_{R,P}/P_{NA}$ (1)	400.1	14932.8	1639.2	283.8	2262.9	2240.7	507.5	2634.8	1130.2
	$P^{t}_{R,P}/P_{NA}$ (2)	263.6	6006.3	5121.1	236.1	2784.7	2212.2	288.9	7647.5	7582.5
	$P^{*}_{R,P}/P^{*}_{NA}$ (3)	401.0	14568.5	11705.2	444.4	5608.5	3818.3	360.9	19499.3	18378.7
	$P_{R,C}/P_{NA}$ (4)	424.7	18306.1	2343.7	300.3	2132.6	2328.1	539.5	5751.7	2356.8
	$P^{t}_{R,C}/P_{NA}$ (5)	349.2	9840.6	5115.1	276.1	1985.6	1389.7	416.7	7609.1	8267.4
	$P^{*}_{R,C}/P^{*}_{NA}$ (6)	504.4	12432.3	12790.0	513.3	6661.8	4299.3	496.3	17614.6	19974.5
Barley	$P_{B,P}/P_{NA}$ (7)	249.5	4791.4	1722.6	194.0	2844.1	2879.6	300.8	1117.6	743.6
	$P^{t}_{B,P}/P_{NA}$ (8)	163.8	2832.4	2356.5	148.9	1941.3	2192.6	177.5	3265.0	2495.2
	$P^{*}_{B,P}/P^{*}_{NA}$ (9)	250.6	7772.2	7043.3	281.0	5575.6	8212.1	222.5	8157.7	6054.2
	$P_{B,C}/P_{NA}$ (10)	233.7	2370.7	2104.1	211.3	2693.6	2420.5	254.3	1186.1	1836.4
	$P^{t}_{B,C}/P_{NA}$ (11)	253.0	5092.2	3514.0	205.8	2584.7	2665.0	296.7	3437.5	4232.3
	$P^{*}_{B,C}/P^{*}_{NA}$ (12)	349.0	7600.4	9859.8	351.7	8602.6	11299.5	346.5	6663.5	8641.5
Soybean	$P_{S,P}/P_{NA}$ (13)	376.8	19513.3	7076.3	263.3	3354.7	3896.7	481.7	11526.2	9766.8
	$P^{t}_{S,P}/P_{NA}$ (14)	194.5	2758.4	1724.5	168.2	1655.7	1759.2	218.8	2547.2	1724.5
	$P^{*}_{S,P}/P^{*}_{NA}$ (15)	294.3	6059.1	3529.7	318.1	4763.8	3641.6	272.3	6250.5	3434.9
	$P_{S,C}/P_{NA}$ (16)	436.2	31474.3	4667.3	284.2	3261.6	4229.8	576.5	16507.1	5037.4
	$P^{t}_{S,C}/P_{NA}$ (17)	301.0	7738.7	1912.4	220.1	1713.1	1671.4	375.6	1689.2	2116.3
	$P^{*}_{S,C}/P^{*}_{NA}$ (18)	410.9	4726.6	3935.3	385.1	4985.8	4226.9	434.8	3304.0	3688.5
Beef	$P_{BF,P}/P_{NA}$ (19)	2628.3	2014923.5	220027.5	1412.0	123264.2	26103.5	3751.1	1134864.1	384117.0
	$P^{t}_{BF,P}/P_{NA}$ (20)	1537.4	184425.3	48793.3	1197.6	54214.5	43578.8	1851.2	30356.1	53205.5
	$P^{*}_{BF,P}/P^{*}_{NA}$ (21)	2263.5	68544.5	78037.0	2247.0	56572.6	66670.2	2278.8	79107.2	87655.2
	$P_{BF,C}/P_{NA}$ (22)	3500.2	2160282.6	161629.5	2194.3	347192.0	92338.3	4705.5	806942.9	220260.6
	$P^{t}_{BF,C}/P_{NA}$ (23)	2086.9	346332.3	58323.8	1542.1	82915.2	48293.5	2589.8	62550.0	66810.9
	$P^{*}_{BF,C}/P^{*}_{NA}$ (24)	2885.8	108655.9	102243.8	2697.1	84343.8	119761.3	3059.9	67901.9	87421.2
Pork	$P_{PK,P}/P_{NA}$ (25)	1457.5	304626.7	143551.4	1014.5	30632.0	41762.5	1866.4	209205.6	229680.5
	$P^{t}_{PK,P}/P_{NA}$ (26)	1149.3	330774.5	120314.5	714.3	16741.8	28432.5	1550.8	284825.0	198060.8
	$P^{*}_{PK,P}/P^{*}_{NA}$ (27)	1877.8	330786.0	165320.7	1364.9	65132.1	49468.6	1631.6	268946.0	263349.3
	$P_{PK,C}/P_{NA}$ (28)	1871.6	438800.3	127000.0	1302.8	71038.2	35014.6	2396.6	203933.5	205141.5
	$P^{t}_{PK,C}/P_{NA}$ (29)	1463.6	453238.6	151343.0	933.1	19454.7	30769.6	1953.4	353965.5	253366.6
	$P^{*}_{PK,C}/P^{*}_{NA}$ (30)	1991.3	349623.9	210888.5	1645.8	58564.0	60883.2	2310.3	406304.3	337816.5

Source: Tables 8-1, 8'-1, 10-1, 10'-1, Appendix 32a and 32b.

[1/] $Z_x = \sum_{t=t_o+1}^{t_o+N} (P_t - P_{t-1})^2/N-1$

where t_o = starting year of the sample period
N = number of observations
P_t = price variable

Figure 21

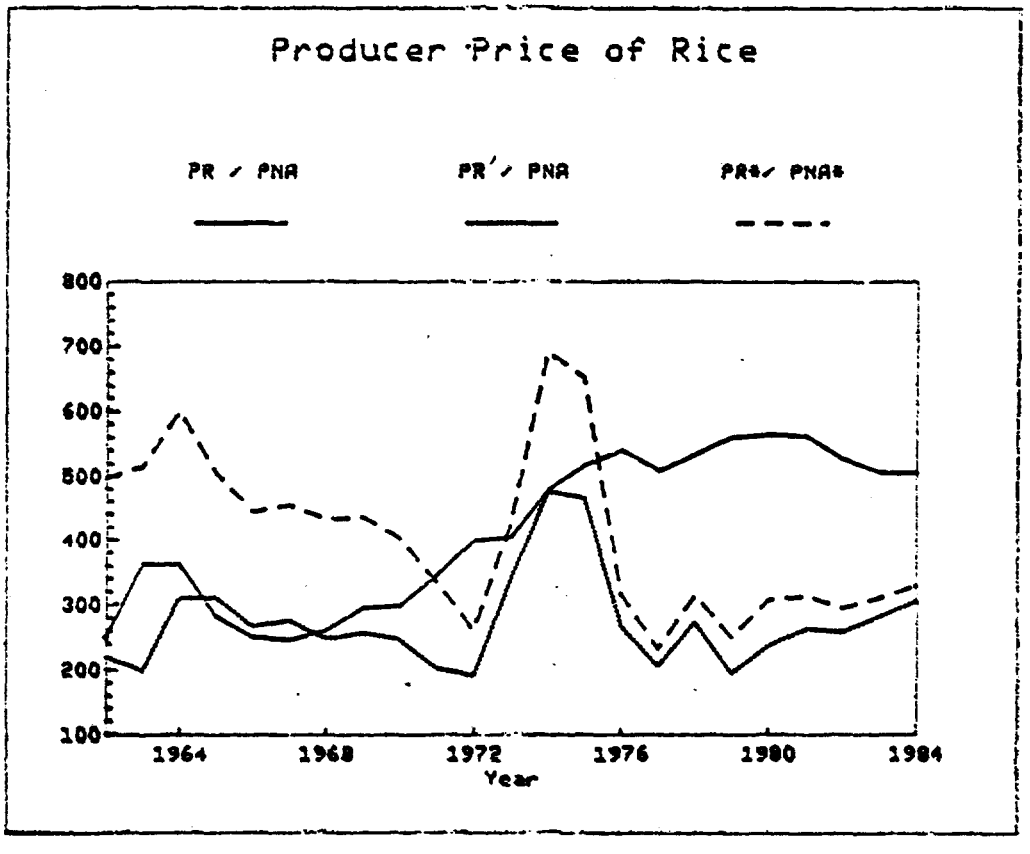

Producer Price of Rice
PR / PNA
PR' / PNA
PR* / PNA*
800
700
600
500
400
300
200
100
1964
1968
1972
1976
1980
1984
Year

Figure 22.

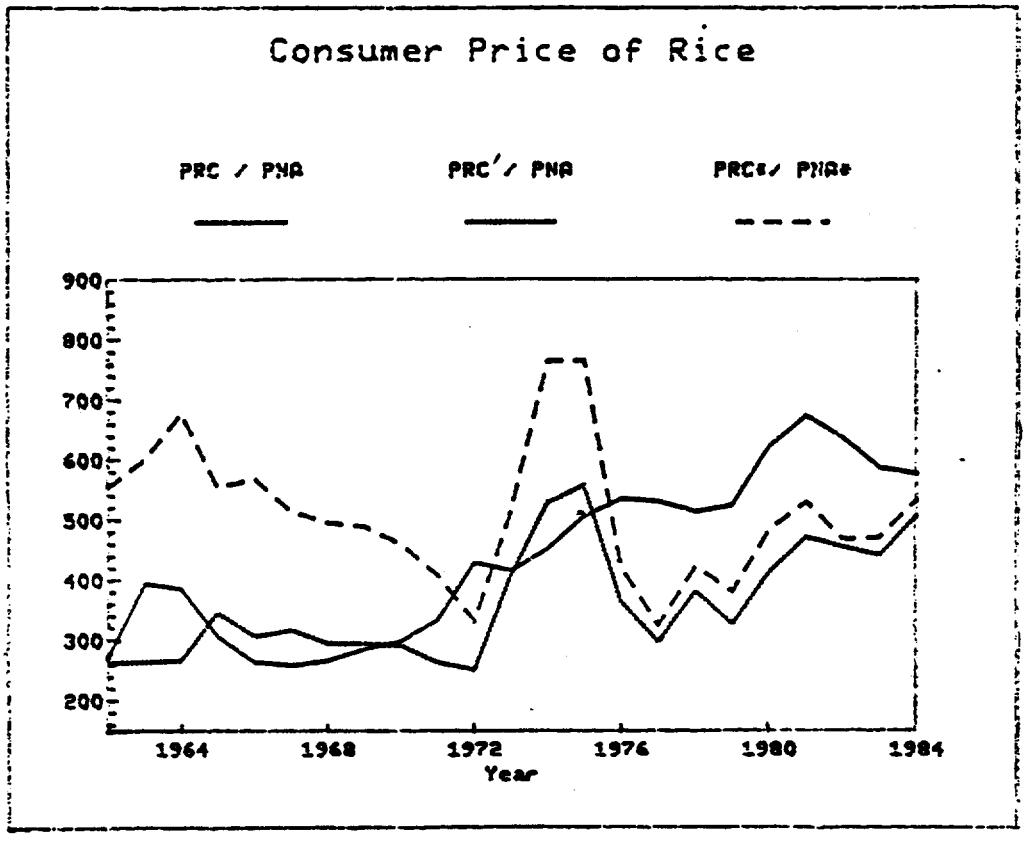

Consumer Price of Rice
PRC / PNA
PRC'/ PNA
PRCs/ PNA
900
800
700
600
500
400
300
200
1964
1968
1972
1976
1980
1984
Year

Figure 23

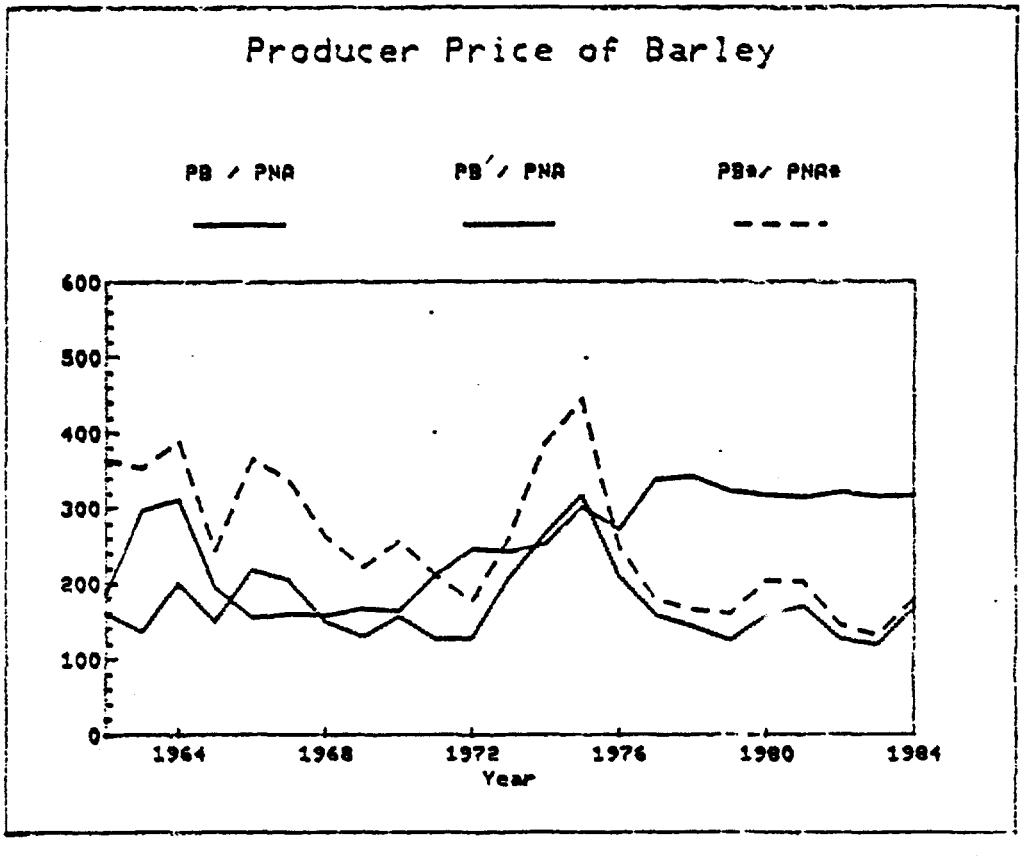

Producer Price of Barley
PB / PNA
PB' / PNA
PB* / PNA*
600
500
400
300
200
100
0
1964
1968
1972
1976
1980
1984
Year

Figure 24

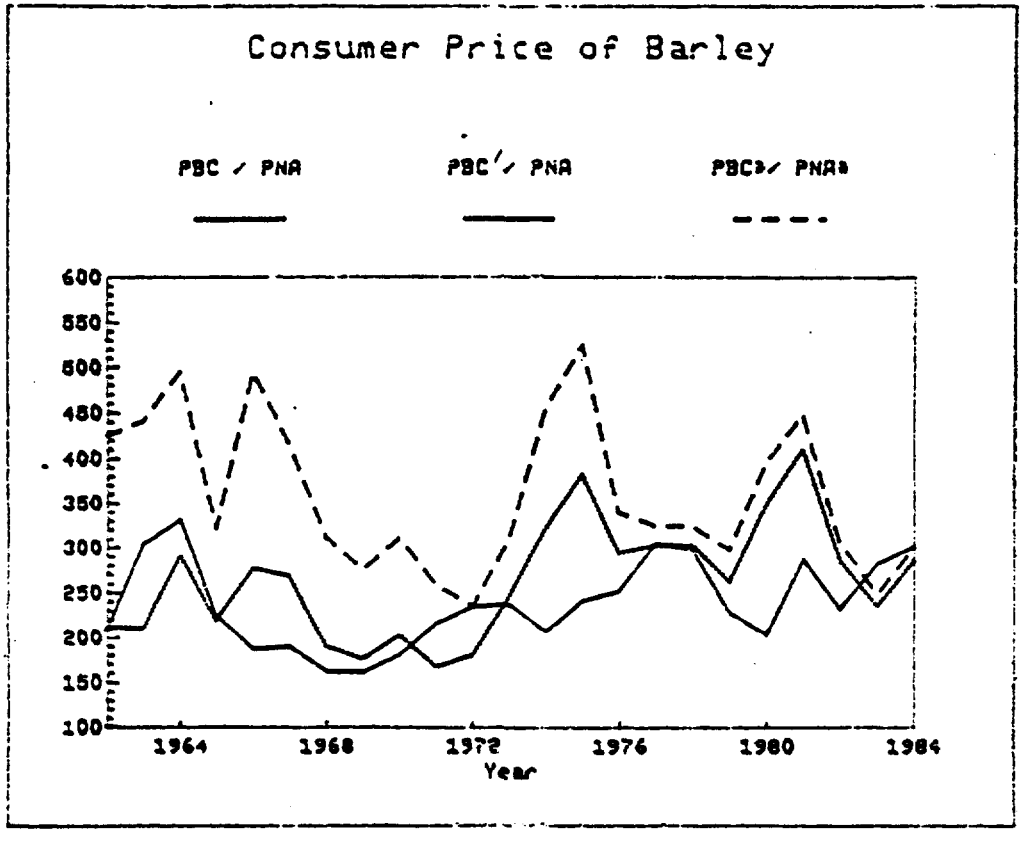

Consumer Price of Barley
PBC / PNA
PBC'/ PNA
PBC»/ PNA»
600
550
500
450
400
350
300
250
200
150
100
1964
1968
1972
1976
1980
1984
Year

Figure 25

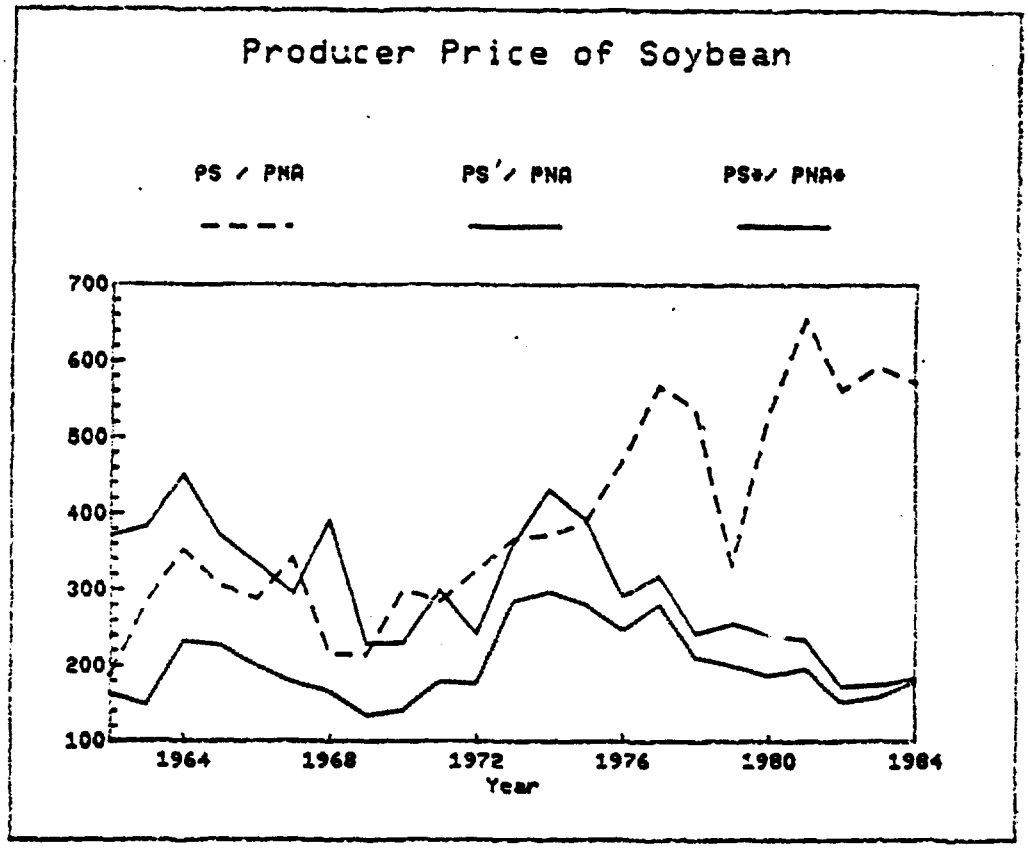

Producer Price of Soybean
PS / PNA
PS'/ PNA
PS*/ PNA*
700
600
500
400
300
200
100
1964
1968
1972
1976
1980
1984
Year

Figure 26

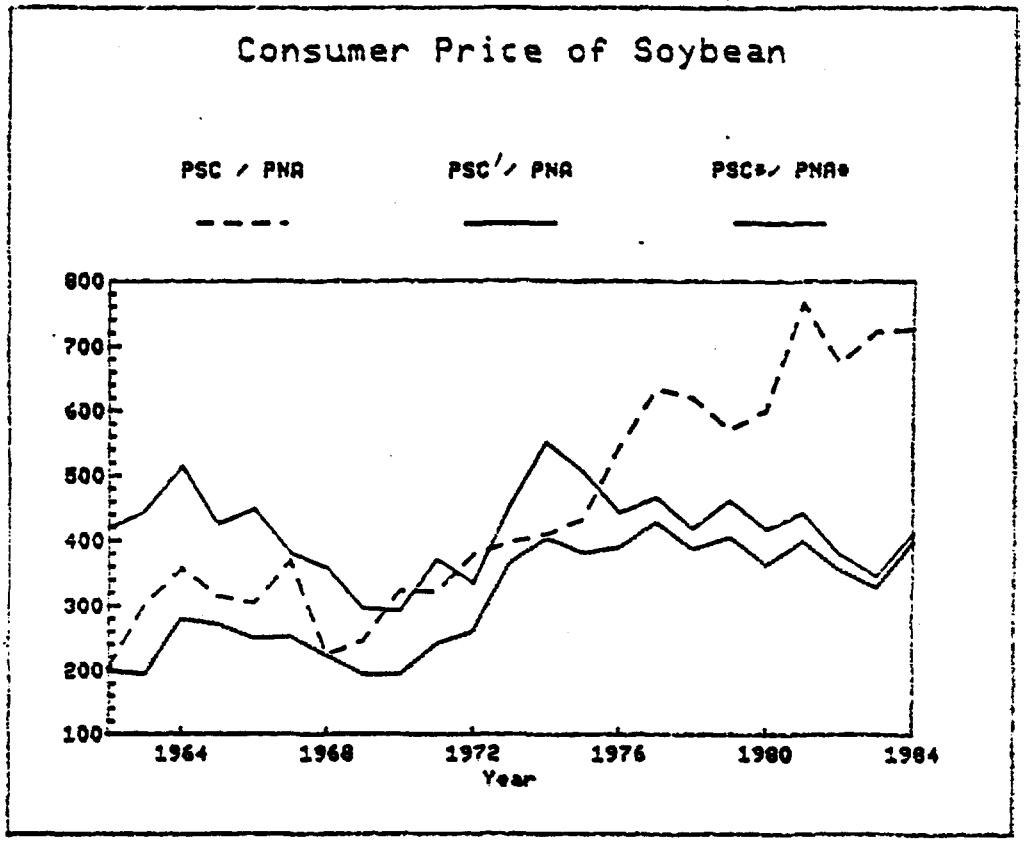

Consumer Price of Soybean
PSC / PNA
PSC'/ PNA
PSC*/ PNA*
800
700
600
500
400
300
200
100
1964
1968
1972
1976
1980
1984
Year

Figure 27

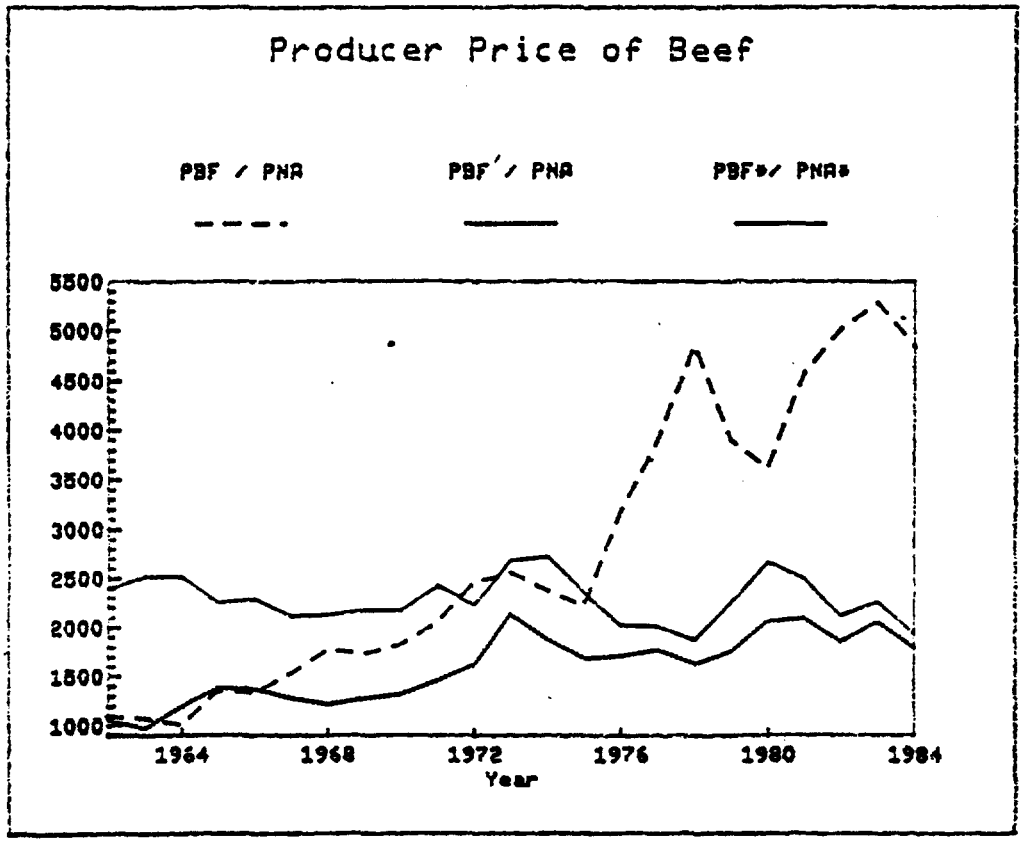

Producer Price of Beef
PBF / PNR
PBF' / PNR
PBF* / PNR*
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
1964
1968
1972
1976
1980
1984
Year

Figure 28

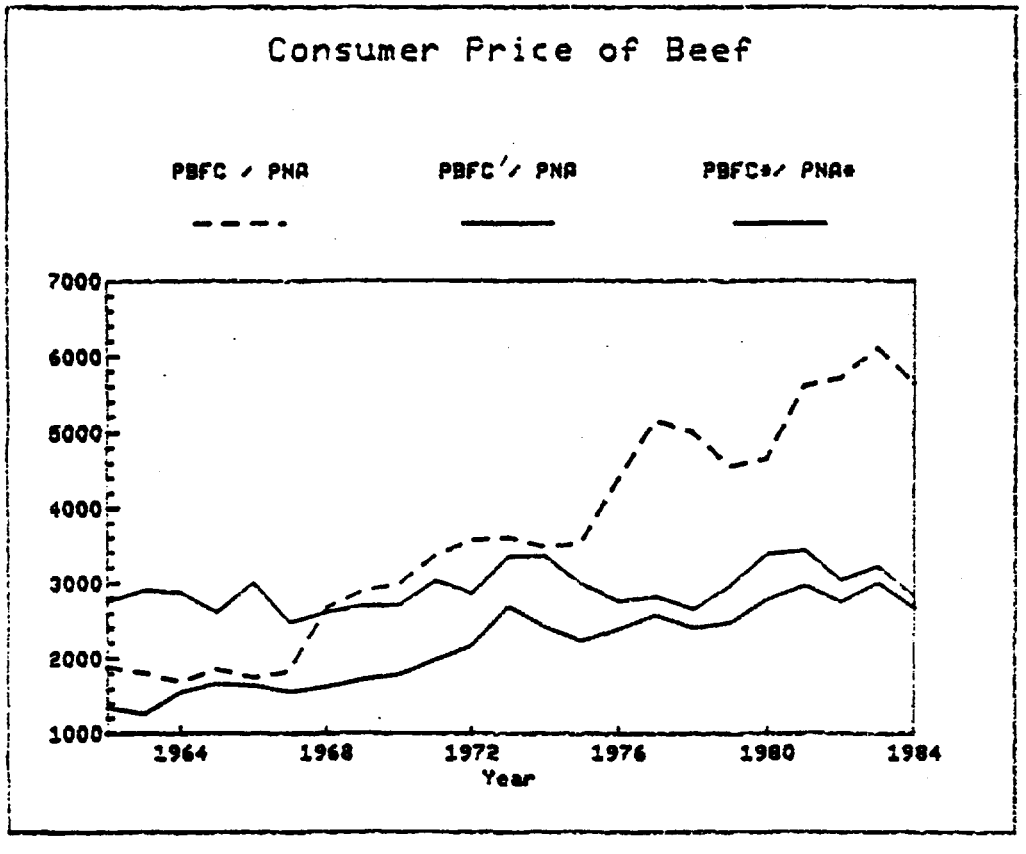

Consumer Price of Beef
PBFC / PNA
PBFC'/ PNA
PBFC*/ PNA*
7000
6000
5000
4000
3000
2000
1000
1964
1968
1972
1976
1980
1984
Year

Figure 29

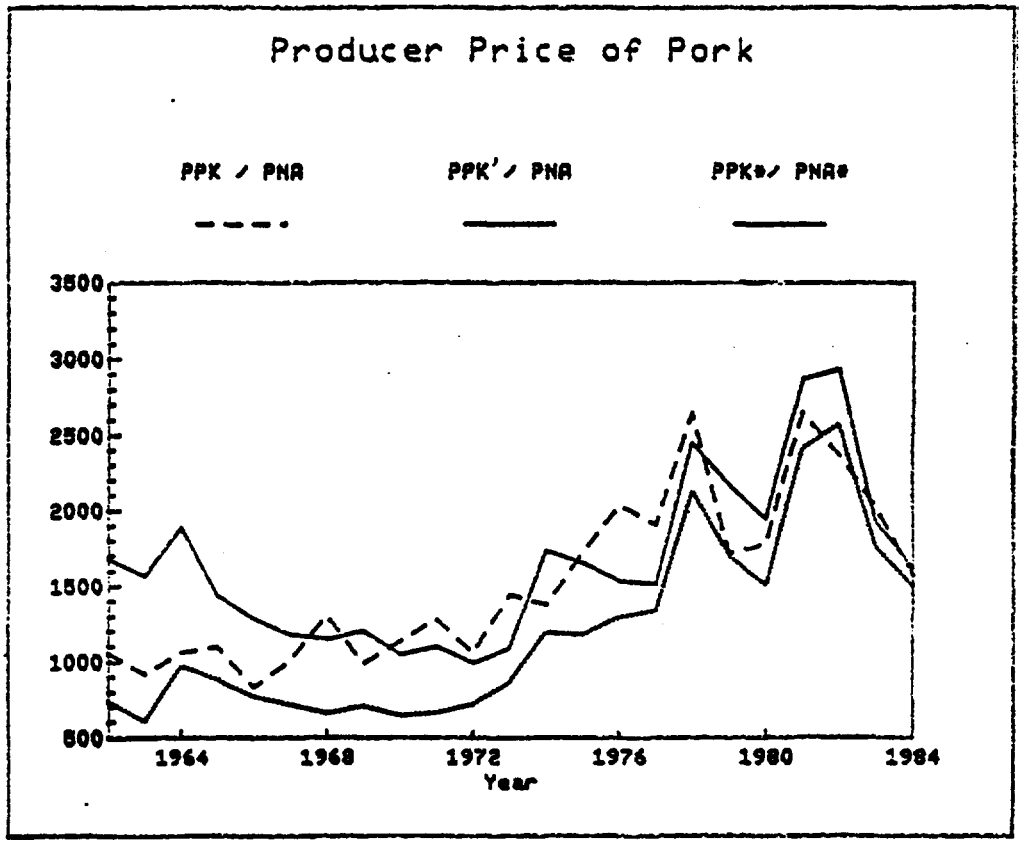
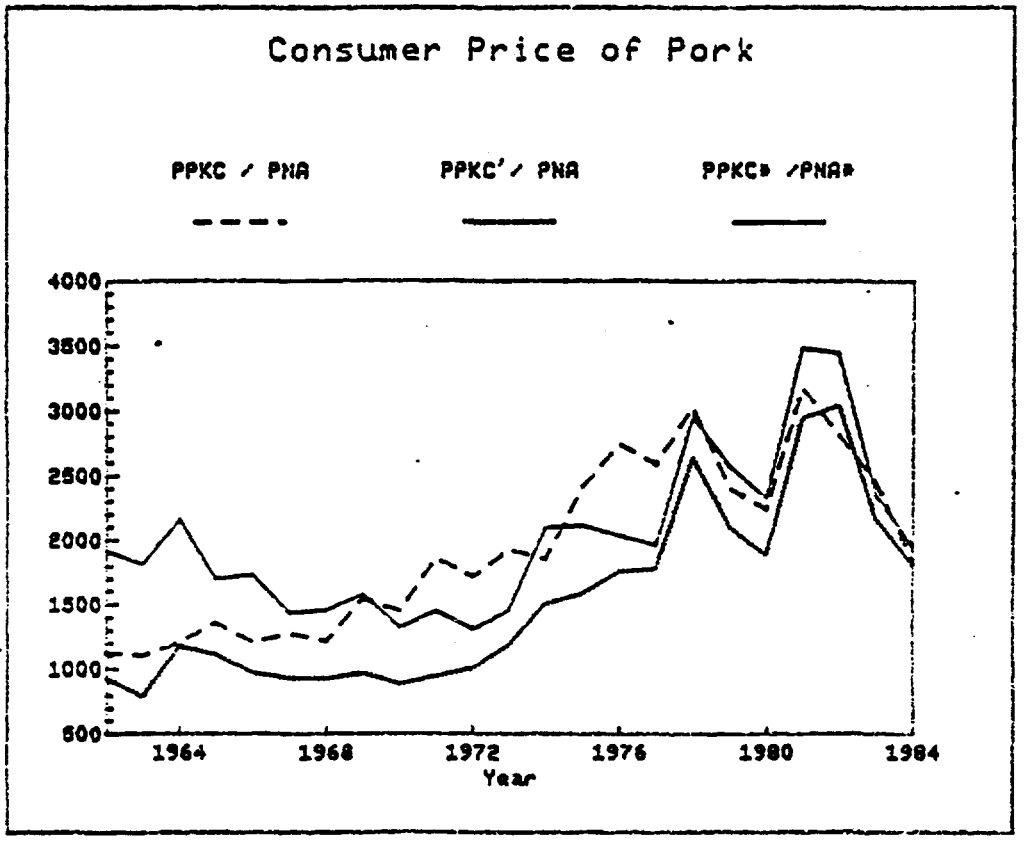

Producer Price of Pork
PPK / PNA
PPK' / PNA
PPK* / PNA*
3500
3000
2500
2000
1500
1000
500
1964
1968
1972
1976
1980
1984
Year

Figure 30


Consumer Price of Pork
PPKC / PNA
PPKC' / PNA
PPKC* /PNA*
4000
3500
3000
2500
2000
1500
1000
500
1964
1968
1972
1976
1980
1984
Year

variability in 1972-84. This higher variability reflects the various administrative measures for increasing barley consumption through the mid-1970s and the rapid decline in consumption thereafter.

In the case of soybeans, per capita consumption recorded much higher variability than per capita output for the entire period and for the two subperiods. This is because per capita consumption increased at a much faster pace with the increase in imports, while domestic production remained almost static.

Comparison of the two variances for beef indicates that the variability of per capita consumption was higher than that of per capita output for the entire period and for the 1972-84 period. This is also ascribable to rapidly increasing per capita consumption with income growth relative to stable domestic production. In the case of pork, domestic output grew about at the same pace as consumption, resulting in almost equal magnitude of variances. The estimated simple correlation coefficients between output and consumption indicate that the higher the degree of self-sufficiency, the higher the simple correlation coefficient for that product.

From the above analysis, one can derive the following conclusions: (1) the variances and Z-statistics of domestic prices for each subperiod were in general smaller than those for the entire period, reflecting the shift toward increased protection in the early 1970s and at the same time the government's efforts to stabilize domestic prices during each subperiod, at a lower level prior to 1970 and at higher level after 1970; (2) both the variances and Z-statistics of the

domestic prices of rice and barley for producers and consumers are lower than those of the two respective border prices for each subperiod, reflecting a price policy deliberately designed to prevent the transmission of world price variability to domestic prices; (3) the variability of border prices evaluated at the equilibrium exchange rate is much higher than that of the border prices evaluated at the official exchange rate for all products.

Table 23. Variances of Output per Capita and Consumption per Capita

		1960-84		1960-71		1972-84	
		Mean	Variance	Mean	Variance	Mean	Variance
Rice	Output per capita	126.8	211.4	122.6	98.8	130.6	284.6
	Consumption per capita	134.0	155.3	128.3	67.1	139.3	179.0
Barley	Output per capita	39.5	145.0	46.7	53.6	32.9	138.1
	Consumption per capita	42.6	125.0	48.0	36.0	37.6	155.3
Soybean	Output per capita	6.6	1.2	6.1	.7	7.1	1.3
	Consumption per capita	11.1	32.1	6.8	1.1	15.0	28.4
Beef	Output per capita	1.4	.3	.9	.1	1.9	.1
	Consumption per capita	1.6	.7	.9	.1	2.3	.4
Pork	Output per capita	3.6	3.4	2.3	.2	4.8	3.4
	Consumption per capita	3.6	3.5	2.3	.2	4.8	3.6

SIMPLE CORRELATION COEFFICIENTS

	Between Output(Q_i^s/L) and Consumption(Q_i^D/L)	Between Output(Q_i^s/L) and Consumer Prices($P_{i,c}/P_{NA}$)
Rice	.650	.214
Barley	.820	-.596
Soybean	.117	.206
Beef	.912	.825
Pork	.978	.618

Source: Appendix 16c, 16d.

Figure 31

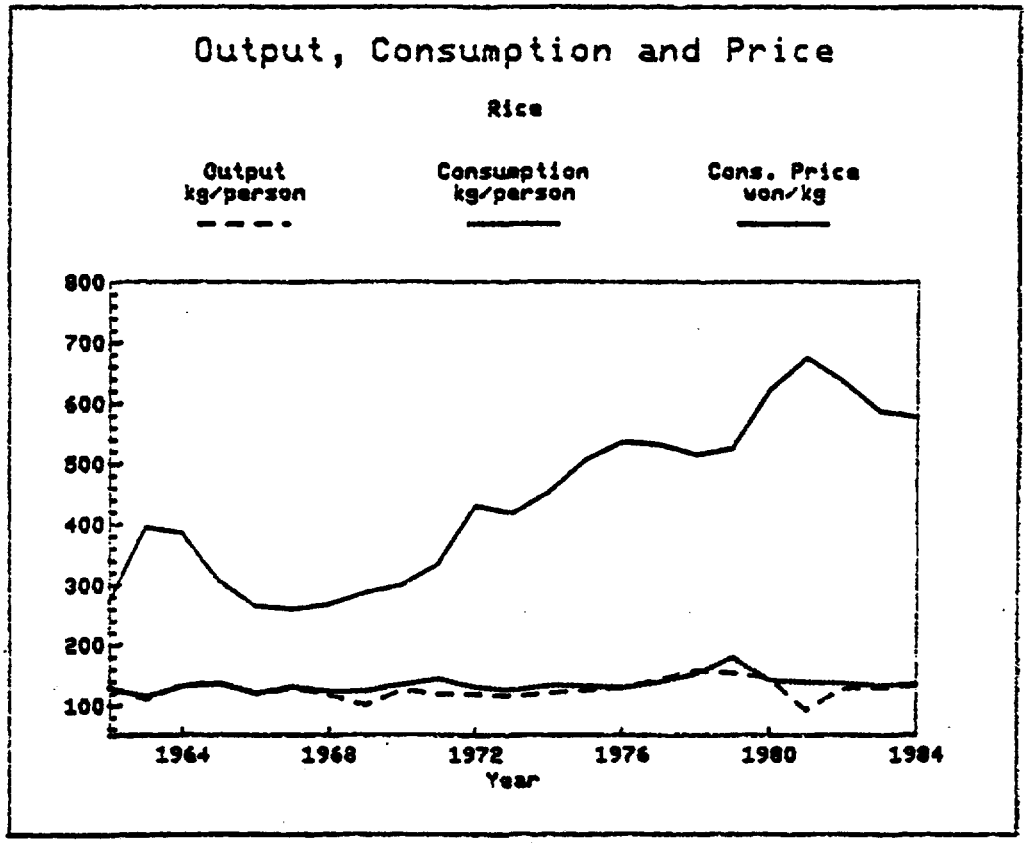

Output, Consumption and Price
Rice
Output
kg/person
Consumption
kg/person
Cons. Price
won/kg
800
700
600
500
400
300
200
100
1964
1968
1972
1976
1980
1984
Year

Figure 32

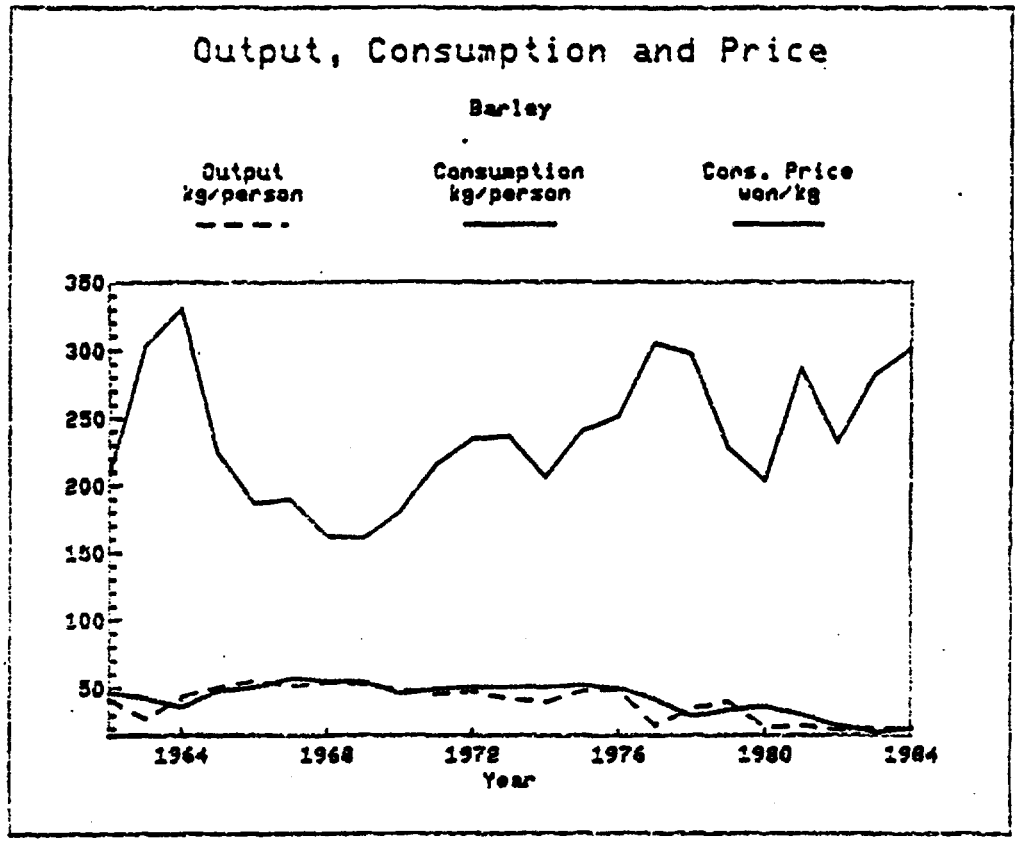

Output, Consumption and Price
Barley
Output
kg/person
Consumption
kg/person
Cons. Price
won/kg
350
300
250
200
150
100
50
1964
1968
1972
1976
1980
1984
Year

Figure 33

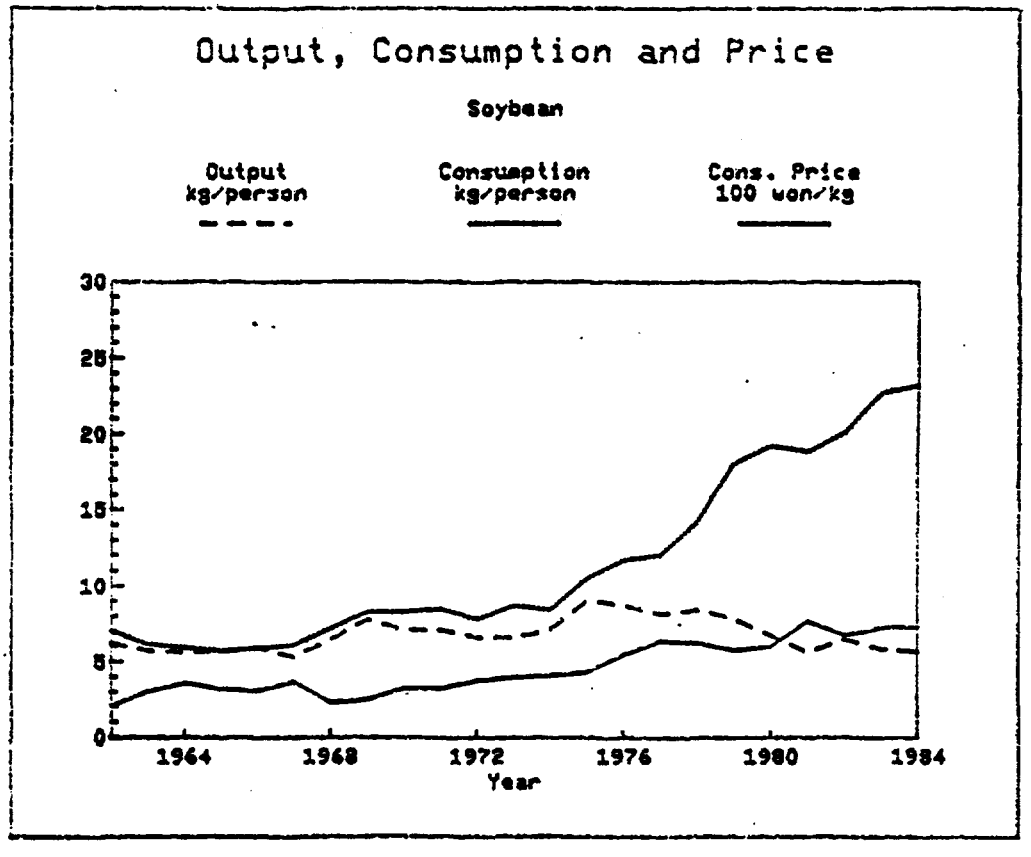

Output, Consumption and Price
Soybean
Output kg/person
Consumption kg/person
Cons. Price 100 won/kg
30
25
20
15
10
5
0
1964
1968
1972
1976
1980
1984
Year

Figure 34

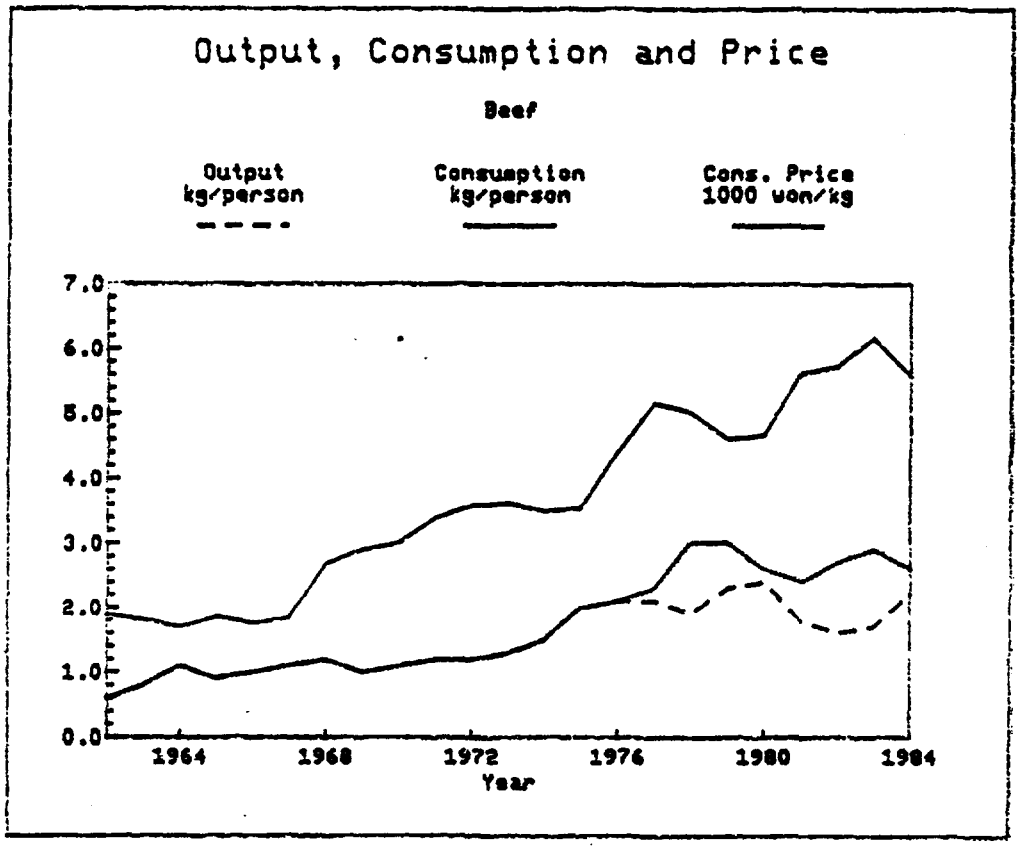
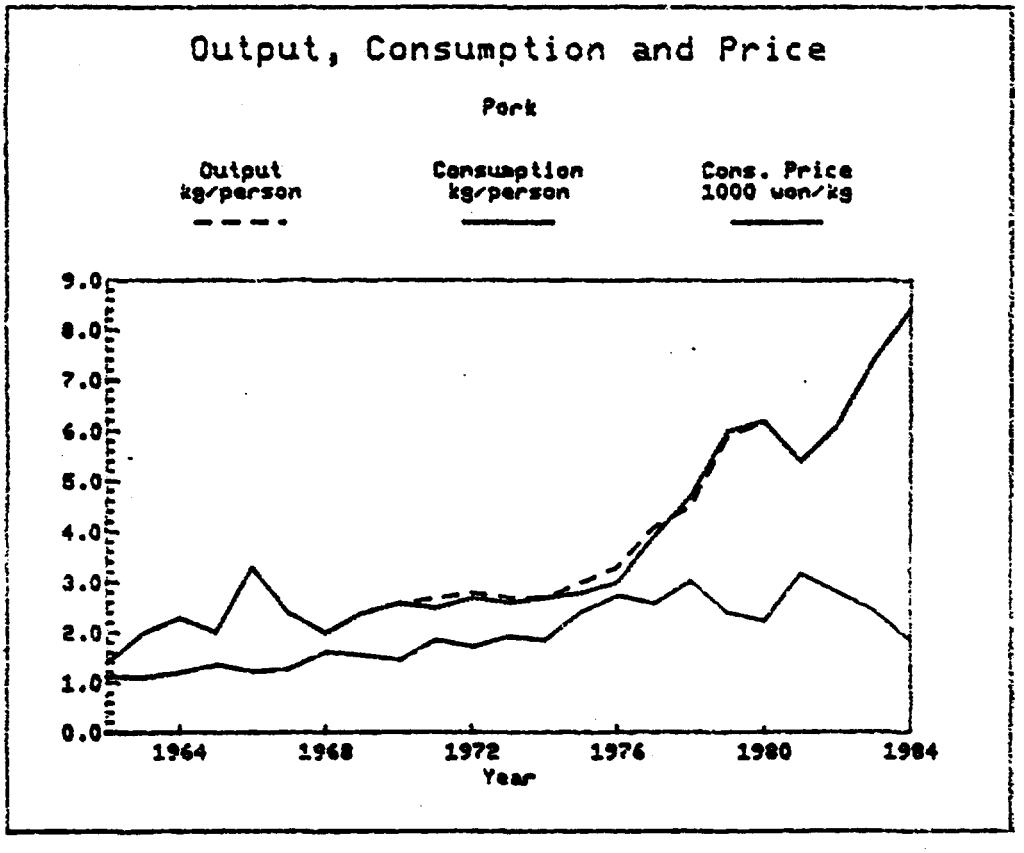

Output, Consumption and Price
Beef
Output
kg/person
Consumption
kg/person
Cons. Price
1000 won/kg
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1964
1968
1972
1976
1980
1984
Year

Figure 35


Output, Consumption and Price
Pork
Output
kg/person
Consumption
kg/person
Cons. Price
1000 won/kg
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1964
1968
1972
1976
1980
1984
Year

Chapter 9

ADMINISTRATIVE IMPACT OF INTERVENTION

Since the enactment of a Grain Management Law in 1950, the grain market in Korea has been characterized by a dualistic system combining free-market transactions and government control, with the degree of government control varying from year to year. The Grain Management Law remains the basic legal authority for the government's food grain policy. The primary intent of the law was to enable the government to obtain sufficient grain from farmers so as to stabilize the national economy by exercising adequate control over grain distribution and consumption. In 1963 and 1967 the main provisions of the law were reaffirmed. The law gives the government full legal authority to regulate the grain market. Free-market transactions occur only by government sufferance. The government has the authority to import or export grain and can give orders to grain dealers, shippers and processors, and to hotels and restaurants whenever deemed necessary. The following are among the programs operated directly or indirectly by the government:

1. Procurement and supply of grain for the armed forces, for government institutions, and for other ministries for relief and work programs;
2. Price support of grain at harvest time through direct purchase from farmers;

3. Stabilization of prices or maintenance of price ceilings on grain in urban areas during periods of seasonal price rises;
4. Grain loans in kind to farmers during spring shortage periods;
5. Provision of relief grain;
6. Payment of wages in kind for government work programs;
7. Provision of seed grain to farmers in disaster areas;
8. Import and export of grain.

The wide range of government grain programs in Korea reflects chronic grain deficits and the belief that direct government action is necessary to maintain economic stability and ensure a steady flow of grain supplies to consumers. It is also consistent with the belief that the provision of grain to the people is a government obligation and that it is the responsibility of the government to take such action as may be considered appropriate or necessary.

In the early years the government acquisition program mainly centered on rice, but more recently the share of barley has substantially expanded. Whenever the government could not secure sufficient domestic grain, the gap has been filled by imports. During the 1950s the market share of government rice in total marketing was less than 10 percent, but had expanded to nearly 30-50 percent in the 1980s. The government handled almost 90 percent of the barley marketed in 1984.

The government acquires grain from farmers at prices set by the government during or after the harvest season. In determining purchase

prices for grain, a number of formulas are considered, including (1) cost of production criteria; (2) price parity ratio; (3) income parity ratio; and (4) international market prices. In practice, however, none of these criteria has been used as the only basis for determining government purchase prices of rice and barley. The purchase prices estimated on the basis of these formulas are used for reference only. In other words, the method of determining government purchase prices has varied from year to year, depending on political and economic conditions.

In the absence of a standard formula, therefore, different government agencies tend to have different opinions. The Ministry of Agriculture and Fisheries is tempted to set the purchase price as high as possible, with a view to enhancing farm incomes and domestic production of grain, while the Economic Planning Board, whose main concern is general price stability, tends to set it as low as possible. The resistance of the Ministry of Finance, whose interest is to minimize treasury outlay, is another restraint against higher prices. These differences in viewpoint -- often called the "interministerial purchase price war" -- cause a delay in final determination of purchase prices, resulting in delayed purchases to the detriment of farm producers. The types of information referred to in determining rice purchase prices and final prices are presented in Appendix Table 49.

Impact of Seasonal Price Stabilization on Grain Marketing

In the 1960s the Korean government expanded the scale of grain operations through increased purchases from farmers. In addition to the original function of supplying grain for institutional uses, the government began to put emphasis on seasonal price stabilization through direct sales in the market during the non-harvest season, when prices normally rise. These direct sales accounted for almost 80 percent of the total government grain supply by 1984. In recent years there has been much criticism of the increasing share of government operations in the grain market.

As shown in Appendix Table 50, when the market share of government-controlled rice (including imports) was relatively low in the 1960s, the rate of seasonal variation in rice prices ranged from 15 to 25 percent. But with the increased share of government rice, seasonal price fluctuations were substantially dampened, and the range was reduced to 4-9 percent throughout the 1970s and early 1980s.

The policy of maintaining a low rate of seasonal variation in market prices causes a substantial impact on grain marketing. The major ones are as follows:

(1) Because there is little or no incentive for grain dealers to invest in storage and other marketing facilities, it is difficult to develop efficient distribution links between farm producers and urban wholesalers. The consequence is that a substantial portion of free market grain is distributed by small, poorly financed retailers who operate in a disorganized and inefficient way.

(2) Since grain is available at any time throughout the year, urban consumers tend to purchase small quantities. Consequently, the government must bear the heavy burden of storing it.

(3) The low profit margin rate for handling government grain, usually fixed at 5-6 percent per bag, often causes grain dealers to engage in fraudulent practices such as cheating on quantity as well as selling lower-priced government rice at higher prices, thus impeding the sound development of grain marketing.

The use of a uniform purchase price during the rice acquisition period has also been subjected to criticism. More than 95 percent of government acquisitions are concentrated in the November-January period. Since farmers are paid the same price, regardless of when they deliver the grain, they are tempted to deliver it as soon as possible.

This gives rise to a number of problems:

(1) Lack of incentives to retain grain for later sales discourages farmers from investing in storage facilities. And because acquisition is concentrated into a two-month period, the burden of financing storage costs falls mostly on the government.

(2) The storage of excessively large quantities of government grain often results in deterioration of its quality. This causes a substantial price differential between government and non-government rice, the difference being 20 to 30 percent. Taking advantage of this price differential, intermediate grain dealers are inclined to pursue illicit profit by fraudulently selling repolished government rice as non-government rice.

(3) The release of a large amount of funds within a short period of time for acquisition causes a lump-sum increase in money supply towards the end of each year.

One possible way of improving the acquisition program would be to adopt differential pricing for varying months, the price difference being large enough to cover storage costs. If the government were to raise the purchase price for deliveries in later months, farmers would have an incentive to hold their grain. In addition, there is no particular reason why the purchase program should be limited to only a three-month period each year. Extending the purchase period would alleviate budgetary constraints. Furthermore, the concentration of purchasing power toward the year-end in rural areas would also be avoided.

This deseasonalization policy has been pursued not because policymakers are ignorant of the various adverse impacts but because their tendency is to care only about short-run impacts, i.e., impacts on the wholesale price index (WPI). Because seasonal stabilization of grain prices is viewed as having an anti-inflationary effect, emphasis has been placed upon dampening seasonal rises. The government customarily uses the change in the wholesale price index (WPI) to measure price stability. A rise in the price of rice is automatically reflected in this index via its weight (4.6 percent in 1980) as the base year). If the price of rice rises to its seasonal peak (say 20 percent), the wholesale price index automatically rises about 0.9

percent, other prices remaining unchanged. This rise in the wholesale price index is viewed as inflationary by policymakers.

Seasonal price variation per se should not be viewed in terms of general price stabilization objectives. A seasonally adjusted price index should be used as a stabilization indicator.

Impact of Ceiling Price System on Meat Marketing

The prices of beef and pork have long been subjected to government control. Under the system, consumer prices of beef and pork were linked to the prices of live cattle and hogs in producing areas as well as to the wholesale prices of carcasses at auction markets. This system proved unable to maintain meat prices at stable level.

In August 1981 the government deregulated the consumer price of meat. At the same time, the government decided to sell imported meat, mainly beef, only by auction on wholesale markets; that is, meat retailers were given autonomy in determining consumer prices by adding marketing costs and appropriate profit margins to the wholesale prices at auction. The government apparently believed that domestic beef production plus imports of 25,000 MT in 1979, combined with a sizeable decline in domestic demand due to recession, caused the price of beef to drop. That resulted in a sharp fall in the domestic supply of beef in 1981, leading to a sharp rise in beef prices despite the imports.

The government then adopted "government-posted prices" which set a ceiling on the retail prices of beef and pork. This ceiling price system still exists, although the ceiling has occasionally been raised. While wholesale prices are determined at the daily auction held

at wholesale markets in major cities, the retail prices are directly controlled by the government.

As long as the wholesale prices of carcasses remain low enough to guarantee adequate profits for retailers, the system should cause little or no problem. In most cases, however, the government sets the ceiling price at such a low level that the auction price exceeds the ceiling price, leaving little or no profit. According to a survey conducted by the NLCF, beef retailers' nominal profit margin averaged only 2.0 percent. With such a low profit margin, beef retailers cannot survive legally.

Yet the number of meat retailers has been increasing despite the virtual absence of a profit margin. In Seoul, for example, the number of meat retail stores increased from 1, 977 to 1975 to 3,135 in 1981 and to 5,050 in 1984. This implies that meat retailing is actually a profitable business, profits being made through irregular trade practices. The major types of illegal dealings are (1) selling cheaper imported beef labelled as Korean beef at higher prices; (2) cheating on weight; (3) mixing lower quality meat with fats; (4) evading taxes and auction commission fees by dealing in the black market.

Since it is virtually impossible to regulate the prices of live animals in producing areas, it is also practically impossible to regulate the wholesale prices of carcasses. Such being the case, the only reasonable way to reform the system is to deregulate retail prices while simultaneously taking steps to improve the marketing system.

The Saemaul (New Community) Movement

Though the prime emphasis of the Saemaul Movement was improvement of rural village infrastructure (roads, bridges, irrigation and marketing facilities, etc.) to facilitate the utilization of improved technologies and the marketing of higher-valued products, the movement's initiative coincided in a complementary way with agricultural pricing policy, especially higher support prices combined with promotion of newly developed high-yielding rice varieties. From its inception in 1971, the Saemaul Movement was a goverment-initiated movement for community development, strongly backed by the late President Park and government agencies at all levels. With government support and assistance, massive-scale investment projects were undertaken for the improvement of physical infrastructure and farm income. As part of the movement, rural people were mobilized as much as their own resources would permit. As a determined government policy, implemented through an authoritarian and bureaucratic administrative structure, the movement has undoubtedly affected almost every aspect of rural Korea during the 1970s.

Considering the history of fatalism and economic stagnancy in rural Korea, an authoritarian approach was both an inevitable and an effective way of bringing about change in rural areas. It may have been a necessary step in mobilizing resources at the village level as well as the bureaucracy at all levels of administration. An authoritarian top-down approach could be justified in the initial stage of development on economic grounds as well. Rural Koreans did not have sufficient

financial and technical resources to improve their own social and economic status. Some kind of inducement mechanism was necessary to stimulate the rural people. Government alone could perform this function and provide momentum as an agent of change.

After ten years of experience, however, the question arises whether this top-down authoritarian approach continues to be an effective way of administering the rural development programs. There are many examples of the authoritarian approach hindering rather than encouraging farmers voluntary participation and leading to mal-allocation of resources.

At the level of the central government, almost all agricultural and rural development activities tended to be categorized under the Saemaul level without direct participation by village farmers. The centralized, authoritarian nature of the government (in particular the fact that it has virtually complete control of local finance) enabled it to exert great pressure on local administrators to produce immediate, dramatic, and concrete results. At the local levels, officials tended to define the Saemaul Movement in terms of the range of directives they received from higher authorities, often with specific targets attached. By and large they did not see themselves as representing or reflecting the opinions, desires and needs of villagers in their districts. Rather, they tended to be concerned with finding ways of handling pressures from higher units to fulfill predetermined plans and quotas. In the actual implementation process, therefore, officials at all levels have been concerned with meeting their immediate targets,

without giving appropriate attention to the adaptability of programs and without concern for the end product -- that is, service to villagers.

Another criticism is that, since individual reputations and promotions depend to a considerable extent on performance in achieving the Saemaul targets determined by higher units, there has been a tendency for a lower administration to overstress positive achievements in reporting to superiors. This practice has often led to an inflation of work performances, even to falsification of reports, so that the ordered targets could be fulfilled on paper. There have been many cases in which excessive bureaucratic zeal in carrying out an assigned task has resulted in widespread resentment among rural people. Examples of this kind of blind execution of instructions from superiors are numerous. The planting of a new, high-yielding rice variety (Tongil) represents the most conspicuous case.

With the aim of increasing rice production, the government alloted, through administrative channels, a target of acreage to be planted with the new rice variety. When it was first introduced in the early 1970s, farmers were willing to adopt quotas because of the high yields and favorable prices paid by the government. Market prices for the new rice began to fall because of consumers' strong preference for the traditional varieties, and farmers realized that they could make more profit from traditional varieties. In 1978 the area planted to high-yielding varieties reached 85 percent of the total paddy area, but it has declined to 24 percent in 1984. Many farmers resisted the quotas, but the government continued to insist that they grow the new

variety. This led to severe conflicts between the public officials and rice farmers. In many cases, local officials even destroyed seed beds planted with traditional varieties.

As discussed above, the style of administration in the sphere of rural development has been obviously inconsistent with the originally enunciated ideology of voluntary participation and cooperation. There is little evidence that the movement itself has promoted a process of planning "from below" or incentives to implement projects voluntarily. Although the various programs of the Saemaul Movement have undoubtedly contributed to upgrading overall agricultural productivity, it is doubtful that they were implemented in such a way as to foster the profitability of individual farms. There has been a tendency to emphasize the achievement of an aggregate target alone and to neglect the profitability of individual farming. With the advent of industrialization and urbanization, the rural people have been enhanced to the extent that they are capable of making their own decisions in seeking profits. Government authorities can no longer expect farmers to submit passively to coercion. Although the national Saemaul headquarters is maintained in Seoul (headed by President Chun's brother), its position is nothing but symbolic with little substance and appears to be largely divorced from villagers' participation. Its village base has almost withered away. An important lesson is that the success or failure of rural development programs depends ultimately on the voluntary efforts of individual farmers as well as on local agricultural-related administration.

Chapter 10

POLICY REFORM EFFORTS

Although the Korean economy is basically oriented toward free markets, government intervention in the farm products market, especially in the grain market, has intensified over time. This intervention has historically been justified on the ground that undesirable developments that hinder the attainment of policy objectives would occur if the determination of agricultural prices were left to market forces.

During the past three decades, economic calculations as well as changes in the political climate have influenced the priorities given to the objectives upon which agricultural policy and development strategy have focussed. A multitude of constraints has also affected policy direction. This chapter is about this shift in the priorities.

Motivations, Objectives, and Effects of Pricing Policies

During the 1950s the government's main efforts were directed toward rehabilitation of the war-wrecked Korean economy and alleviation of the postwar inflationary spiral. Policymakers were particularly sensitive to the impact of farm product prices on urban wage earners' costs and on inflation. In addition, the government wanted to provide grain at less than open-market prices to wounded veterans and their families, workers in critical industries, and to those who were assumed to be less able than "normal" consumers to buy food at market prices. Furthermore, the government wanted to minimize the annual payments that

it had to make to landlords who were forced to sell land under the land reform program of 1950. These landlords were given government bonds whose face value was stated in quantities of rice.

Government investment in agriculture was severely limited because of increasing budgetary requirements for rehabilitation works and defense. About all that the budget was capable of financing in the agricultural sector were maintenance of existing irrigation facilities and importation of fertilizer. The policy of low agricultural prices was reinforced by the easy availability of American grain on concessionary terms from the United States. Although the importation of aid grain contributed significantly to a stable food supply and general economic stability, it presumably created a disincentive to increase domestic production of grain.

By the early 1960s the economy had recovered from the war, and the major objectives of economic policy shifted from rehabilitation to expansion. The basic goal of policy, as envisaged in the first and the second development plans, was to build a foundation upon which to attain self-sustaining economic growth. The terms "increased domestic food production" and "rural-urban income equity" appeared in almost every policy document, and a Farm Products Prices Maintenance Law was promulgated in 1961. The purpose of the law was "to maintain proper prices of agricultural products to insure the stability of agricultural production and the rural economy." The products covered by the law included rice, barley, and other agricultural products as determined by

the Minister of Agriculture and Forestry (now the Minister of Agriculture and Fisheries).

Despite stated objectives of food self-sufficiency and adequate farm income, greater emphasis continued to be placed on general price stability. Because of the leading role of grain as a wage good, a rise in the price of foodgrain was believed to be one of the major causes for a rise in the general price level. Therefore, stabilization of foodgrain prices through increased imports has been one of the chief considerations in the government effort to achieve price stabilization. Low food prices for urban workers, whose expenditures for food accounted for almost 60 percent of total living costs in the mid-1960s, were not only rationalized in terms of equitable income distribution but also served to protect industrial interests and capital formation in the non-agricultural sector.

Yet it is a widely accepted notion that savings in the rural sector, whether created by voluntary savings of farm surplus or derived through such compulsory measures as land taxes, provide essential sources of investment financing in the initial stages of industrialization. In Japan, for example, heavy taxation of farmland served as one of the important transfer mechanisms through which the agricultural sector provided investment resources for the non-agricultural sectors (Hayami, 1975). In Taiwan, an increase in agricultural productivity and the resultant farm surpluses were important sources of investment financing that accelerated the process of industrialization (Hsieh, 1966). This hardly seems to have been the

case in Korea, however, for there is little evidence that the agricultural sector provided sizeable financial resources for investment in the non-agricultural sectors during the 1950s and 1960s. There was not much farm surplus in the form of rural savings, and the political atmosphere in Korea after World War II was such that it did not permit heavy taxation of the rural sector. In the 1950s, farmers in general had a negative cash flow. In the 1960s they were able to save a portion of their income, but relatively little of their savings went into the non-agricultural sector. Korean farmers began to achieve substantial cash savings in the 1970s, but most farm savings remained on the farm in the form of farm equipment purchases, housing improvements, and the like. Moreover, government financial policy was not executed in such a way as to transfer substantial sums of money out of agriculture to other sectors (Ban, Moon and Perkins, 1980).

Agricultural price policy was a different story. When the supply of labor was highly elastic and rural areas were overpopulated in the initial stage of industrialization, low foodprices helped keep labor costs down.

The persistent negative price policy for major food grains eventually hindered efforts to increase food production.12/ But as

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12/ One may question how one could assert that the government had implemented "low food price policy" or "negative protection" in the 1950s and 1960s in spite of the positive nominal protection rates (NPR_D) in those years. Even though the degree of overvaluation had neither been calculated nor officially announced, policymakers as well as academic circles were well aware of the fact that the Korean won had been highly overvalued

imports of aid grain were reduced, food grain imports caused a substantial drain on foreign exchange reserves.

A rapid influx of rural migrants into urban areas during the 1950s and 1960s also made officials more aware of the need to improve rural living conditions. Government officials became increasingly concerned that the urban infrastructure might collapse in the face of ever-increasing numbers of rural migrants. Meanwhile, rural poverty was becoming urban poverty.

Another change also impelled the regime to reorient economic policy toward agriculture. It was that rural people became increasingly conscious of the widening gap in the standard of living between city and rural areas. Historically, rural voters had tended to support passively whichever regime happened to be in power despite its urban-biased economic policies. Since the rural landlord class that could have constituted a political pressure group had been erased by land reform, the government felt no urgent concern about the political allegiance of rural voters.

Although a group of Korean farmers have organized themselves into the Catholic Farmers' Association (the only rural organization of a grassroots nature in Korea), its membership is not large enough to exert

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in those years, resulting in a persistent squeeze on agriculture. The fact that the curb market exchange rates in those years were nearly twice or three times as high as official rates and that the effective exchange rates on exports (though not applied to rice farmers due to the government monopoly on rice exports) were substantially higher than the official rates provide evidence of how highly the won was overvalued.

institutionalized pressure on the government. And the National Agricultural Cooperative Federation, as mentioned earlier, is totally controlled by the government. In this respect, Korea contrasts strongly with Japan. In Japan, coop members not only apply political pressure directly to their elected representatives but also are able to make their demands for protection effective through the cooperative movement (Anderson and Hayami, 1986).

As a foreign cynic points out, the political impotence of Korean farmers mean that the state could manage agriculture as "one farm" (Wade, 1982). But over time the situation changed. Electoral erosion for the late President park in rural areas in the 1971 presidential vote was perceived as an ominous popular reaction to the bias against agriculture in economic development policy. The world food crisis in the early 1970s and soaring grain prices in the world market made it inevitable for the government to shift emphasis toward agriculture.

The Shift to Positive Protection

Starting in 1969, the prices at which the government purchased rice and barley steadily increased. Another major shift was initiation of massive investment in the rural infrastructure under the Saemaul (New Community) Movement. High priority was given to expansion of irrigation facilities and paddy field consolidation projects. A rice self-sufficiency program -- increased production from high-yielding varieties combined with higher prices and input subsidization -- became the core

of rural income policy, since rice was a key component of the crop mix of the average farmer.

A more supportive agricultural policy was also reflected in a shift from negative to positive protection for major agricultural commodities. While the government undertook to liberalize imports of a wide range of industrial items by the early 1970s, most tradable agricultural products were controlled by the Trade Notice, the surveillance list, or special laws, such as the Grain Management Law and Livestock Development Law. There was thus strict management of agricultural trade to ensure that there would be imports only to fill domestic shortages (Yang, 1985). The average effective rate of protection for rice rose from (-26) percent in 1960-69 to 39 percent in 1970-79 and to 74 percent in 1980-84. For beef, protection rose from (-)20 percent in 1960-69 to 40 percent in 1970-79 and to 112 percent in 1980-84 (see Table 12). In terms of the intersectoral flow of resources between the agricultural and non-agricultural sectors (as measured in Table 17c), the agricultural sector provided more than 22 percent of total GDP during the 1962-69 period, but in the early 1970s the financial flow reversed. The total of price-related and non-price-related transfers from the non-agricultural to the agricultural sector amounted to about 15 percent of total GDP in 1970-79 and 34 percent in 1980-84. The government investment bias (GIB) (as measured in Table 16), rose from .4-.8 in the 1960s to 1.0-1.3 in the 1970s and to 2.0 by the mid-1980s, implying that the agricultural sector came to receive more and more

investment resources relative to what it contributed to growth of national output.

Owing to expanded cultivation of high-yielding varieties, improved farming techniques, and expanded investment in the rural infrastructure, a remarkable increase was recorded in aggregate farm output in the 1970s, especially in grain production. Total food production measured in terms of the index increased from 55-60 in the early 1960s to 120-130 in the late 1970s (see Table 4). Despite this rapid growth in overall food production, self-sufficiency in grain production declined from 93.9 percent in 1965 to 73.0 percent in 1975 and to 38.9 percent in 1984. This decline was mainly due to increasing demand for wheat, corn, and soybeans. Self-sufficiency in rice, however, was nearly attained by the late 1970s.

The effects of government policy on farm income can be measured by the growth of farm household income relative to that of urban wage-earners. During the 1960-69 period, when the government's economic policy was urban-biased, the annual average growth rate of income for urban wage earners was 14.6 percent, whereas that for farm households was only 3.5 percent. During the 1970-76 period the situation was reversed: farm household income increased at an annual rate of 9.5 percent, while that of urban wage-earners increased at a rate of only 4.6 percent, resulting in substantial improvement of farm income relative to urban earnings. Since the late 1970s, however, farm income has risen at a slower pace than that of urban wage-earners.

The Government Deficit as a Constraint

Although increases in food costs were bothersome to the industrial sector, industry was not in a position to block the increases, partly because of Korea's bitter experience during the 1973-74 world food crisis. But the urban interest in cheap food, particularly for lower income groups, was not totally ignored by the government, which decided that the burden of supporting agriculture by means of higher prices could not be placed on food consumers only. The policy choice was a two-price system for staple food grains -- that is, higher purchase prices for producers and lower selling prices for urban consumers, with the financial burden borne by the government.

A two-price system for barley was put into effect beginning with the 1969 summer crop, and for rice beginning in the fall of 1969. Until 1968, the selling prices of rice were determined by adding intermediate handling costs to the original acquisition prices, resulting in no financial loss to the government. Beginning with the 1969 crop, selling prices (except in 1971) fell below the costs of acquisition and intermediate handling. After 1973, this difference continued to widen, and the loss incurred by the government amounted to 20-25 percent per 80 kilo bag every year.

In the case of barley, the price differences were even wider. Government efforts to keep barley prices at a low level for consumers were motivated by a desire to induce consumers to substitute barley for rice. Prior to 1969, market prices of barley had been maintained at around 65 percent of rice prices. But with the increasing subsidy, the

price of barley for urban consumers was lowered to 40 percent or less of the rice price (see Appendix Table 16b). Other administrative measures, such as requiring all restaurants to serve non-rice items on Wednesdays and Saturdays, were also taken to save rice. However, as per capita income grew, the average consumer became less responsive to changes in the relative price of barley because of a relatively stronger preference for rice. The two-price policy for barley no longer exerted an effect on the marginal rate of substitution between rice and barley. Administrative measures to influence rice consumption were abandoned (without a formal announcement) in the late 1970s.

The two-price policy may have saved rice and alleviated upward pressure on consumer prices, but implementation caused government costs for grain operation to increase at an accelerating pace. During 1970-84, the total financial loss amounted to 2,073 billion won (approximately US$3.5 billion).

If the deficit had been paid for out of the general budget account, the effect would have been a reduction in budget expenditures for other sectors. So far as the grain operation was concerned, this was not the case. Faced with increasing budgetary requirements in non-agricultural sectors, especially for defense purposes, the government relied upon inflationary financing. Most of the deficit has been financed through a long-term overdraft from the central bank and also partly through the issue of short-term grain bonds with a one-year maturity period. The outstanding balance of long-term borrowing totalled 1,710 billion won (approximately US$2.5 billion) at the end of

1984. Repayment of grain bonds has been financed either by long-term overdrafts or the reissue of grain bonds. Whichever method may be used, the result is an increase in money supply.

Appendix Table 31 shows how this net increase in the money supply contributed to overall monetary expansion. It accounted for about 22 percent of the total increase in money supply in 1972, rose as high as 98 percent in 1975, and thereafter accounted for approximately one-fourth of the total increase in the money supply.

A net increase in the money supply is bound to cause upward pressure on the general price level.13/ This is because lumpsum funds released at the time of grain acquisition are very likely to be spent immediately by farmers. For this reason, the two-price policy was self-defeating. The expanding scale of the government deficit finally became a serious constraint to agricultural price policy.

An important lesson is that either a grain deficit must be financed from the general account budget or an attempt must be made to eliminate the deficit by narrowing the differential between purchase and

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13/ In Japan, the grain deficit arising from the two-price policy for rice is financed by the national budget. The effect of such financing on income distribution is exactly opposite to that of financing with an overdraft from the central bank. Financing from the general account means that the funds are derived in principle from tax revenue. In as much as direct tax is concerned, higher tax rates are applied to higher income earners. Therefore, financing the grain deficit from the general account has the effect of transferring income from higher income groups to lower ones.

selling prices. In other words, once the government price is set, the price must cover all costs.

As long as the government makes grain purchases from farmers, there are two ways to narrow the differential: a relative reduction in the purchase price, or a relative increase in the selling price. According to the analysis in the foregoing section, a 10 percent rise in the real price of grain would have the positive effects of increasing rice production by 2 to 3 percent and of boosting farm household income by 7 to 8 percent. From the opposite view, the same percentage rise in the real price of grain would result in only a 0.5 percent increase in the general price level and a 1.0 percent increase in the consumer cost of living. In view of this trade-off, one easily reaches the conclusion that the government selling price must be raised to eliminate the grain deficit. Such action would probably save the government more than it would cost the private sector.

Seeking Substitutes for Price Support

Are there less expensive ways to increase farm income? Many economists and public officials argue that farm income should be improved through programs other than subsidies of agricultural prices.

One possibility would be to increase agricultural productivity, particularly labor productivity, and thereby reduce the domestic cost of producing food. However, there is limited scope for doing this. The small size of Korean farms is the main restraint. With average size of one hectare per farm, the possibility of substituting capital for labor is limited.

Many people have begun to advocate an easing or even a repeal of the three-hectare ceiling on individual ownership of farmland. Their belief is that such action would expedite the concentration of landholdings by increasing the transferability of land titles. Although the proposed relaxation could pave the way for some farmers to expand the scale of their farming operations, the trend in South Korea has not been toward larger holdings. As explained elsewhere, the proportion of medium-sized farms has been increasing, while the proportion of farms with more than 3.0 hectares has been declining. Since the market price of farmland is much higher than the value of the land as determined through the capitalization of income obtained by farming, there is a strong tendency to hold agricultural land as an asset. This tendency is most conspicuous among the medium-sized farmers, who are in a better position to achieve financial stability by supplementing their farm incomes with off-farm earnings. This suggests that the average size of farm in Korea will remain static for quite a long time to come.

Another way to achieve rural-urban income parity would be to foster rural industries. The share of farm income from non-agricultural activities remained, as of 1984, little more than 10 percent in Korea, whereas it is as high as 80 percent in Japan and 70 percent in Taiwan.14/ This suggests that policies to increase rural people's

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14/ This wide difference in the share of non-agricultural income is partly due to differences in industrialization and partly due to Korea's relative neglect of rural development throughout the postwar decades. In the course of Korea's industrialization, industrial activities have been heavily concentrated in urban

access to non-agricultural employment in rural areas could be a substitute for agricultural price supports.

This approach is not new. In fact, a rural industrialization program was launched in Korea in the early 1970s under the Saemaul (New Community) Factory Program. According to official statistics, a total of 741 factories had been established in rural areas by 1982. But because of lack of effective linkages with related industries, marketing inefficiency, poor management, and so on, only about 400 have survived.

Given current infrastructural conditions in rural Korea, however, the expansion of off-farm employment sources cannot be achieved in a short period of time. Promotion of off-farm employment through rural industrialization can only be achieved in the context of a long-term goal that involves concerted regional planning.

The government's institutional framework for decisionmaking is another limiting factor in the pursuit of rural industrialization. In

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areas. In contrast, Japan and Taiwan followed a path in the initial stage that utilized much of the farm labor force in rural industrialization that involved less movement of workers. A number of factors are responsible for the urban concentration of industrialization in Korea. First, Korea pursued an outward-looking development strategy with heavy emphasis on exports from an early stage. Rather than developing domestic markets, entrepreneurs focussed primarily on export markets for which generous incentives were provided. With readily available port facilities and other conveniences, Seoul and Busan gave easier access to export markets and thus offered more favorable location for business activities (Ho, 1977). Second, the highly centralized nature of the government administration that is still the norm has added to the geographical concentration of industries. Seoul is the place where major governmental decisions affecting all facets of business operations were made. In this situation, concentration seems inevitable. (Park, 1986).

Korea there are six ministries which are responsible for policies affecting the rural population: the Economic Planning Board, the Ministry of Finance, the Ministry of Agriculture and Forestry, the Ministry of Commerce and Industry, the Ministry of Construction, and the Ministry of Health and Social Affairs. Despite the establishment of a Coordination Group in the Economic Planning Board, it appears to be extremely difficult to reach agreement on comprehensive programs which require a trade-off between agricultural and non-agricultural rural investment.

The limited possibility of growth in agricultural productivity and limited success in rural industrialization will continue to give farmers an incentive to seek more income through governmental price supports. The continuation of such supports was emphasized in a Korea Times editorial:

> Although it may be a natural consequence of the rapid industrialization of Korean society as a whole, a too sudden degeneration of agriculture must be averted because, once the farms are left to ruin, it will be all but impossible to restore them. It has been reported that about half a million people give up farming every year, most of them owners of lands too small to be economical. The exodus from the farms poses another grave social problem of unemployment, since the present industrial facilities are not yet sufficient to absorb all those leaving the villages.
>
> Some government economic planners, however, are advocating a policy of discontinuing or drastically curtailing the farm price support program in order to reduce the budgetary deficits accruing from it. Some others also hold the view that as a move to hold down general inflation the imports of foreign farm goods, which are much cheaper than local produce, must be broadly liberalized. We strongly doubt the wisdom of such moves which seem to ignore the strategic importance of domestic food production as a vital national resource (May 15, 1979).

There is also the possibility that expansion of off-farm employment opportunities may cause (1) a further rise in farmland prices due to increased demand for residential and industrial sites; (2) overinvestment in farm machinery because of a rise in rural wages; and (3) a decrease in incentives for farming. Thus, rural industrialization, which is thought to be a substitute for agricultural price increases, may, paradoxically, exert an upward pressure on agricultural prices. On the other hand, as pointed out by Anderson and Hayami, the political costs of higher food prices for urban consumers will decline as the share of food costs in urban household budgets declines (Anderson and Hayami, 1986).

Quantitative Specification of the Determinants of Price Support

The present section quantifies the relationship between the level of domestic price support and the potential determinants of price policy decision-making in Korea. In an attempt to measure the explanatory power of the selected policy determinants for each product, the following log-linear multiple-regression model was employed:

$$\ln P^D = a_o + a_1 \ln P^B + a_2 \ln PI + a_3 DO + a_4 DP + e$$

where:

P^D = Domestic nominal producer price

P^B = Corresponding border price

PI = Domestic inflation rate

DO = Dummy variable for the year of crop failure

= 1 if the year of crop failure

= 0 otherwise

DP = Political dummy variable

= 1 if the year of election

= 0 otherwise

The estimated results are presented in Table 24. Overall, the model fits the data reasonably well with high R-square, and judging from the statistical significance level of the estimated coefficients the results seem to be consistent with the previous discussion of the political economy of pricing policy.

The estimated coefficients for the border price, or transmission elasticities, are not significantly different from zero for rice, barley, soybeans, and beef. As already stated, the level of border prices has rarely been taken into consideration in determining the level of price support in Korea. Despite a heavy dependency on imports, the government has persistently pursued a policy of insulating the domestic prices of these products from world price changes. Only for pork was the border price positively correlated with the domestic producer price, reflecting the high comparative advantage of Korea's swine-raising industry.

The estimated coefficients associated with domestic inflation are highly significant for all products, and surprisingly the magnitudes of the coefficients are close to unity for all products. This suggests that changes in the general price level are important determinants of

Table 24. Estimated Coefficients for Determinants of Price Intervention

Dependent Variable	Constant Term	Independent Variable: Border Price (P^B)	Inflation (PI)	Output Dummy (DO)	Political Dummy (DP)	R^2
Price of:						
Rice(P_R)	.219 (.456)	.112 (.977)	1.163 (21.029)	.028 (.390)	.072 (2.416)	.991
Barley(P_B)	.388 (.564)	.103 (.579)	.990 (11.609)	.291 (2.752)	.073 (.893)	.974
Soybean(P_S)	(-).025 (.030)	.160 (.896)	1.173 (13.893)		(-).119 (1.717)	.984
Beef(P_{BF})	1.138 (1.126)	.127 (.580)	1.398 (12.220)	.083 (2.344)	.044 (.938)	.996
Pork(P_{PK})	.831 (1.760)	.305 (2.839)	.980 (10.576)	.109 (1.890)	(-).021 (.333)	.989

* Estimation based on 25 observations (1960-84).
Figures in parenthesis are t-values.

producer prices, whether they are determined by discretionary government policy or by market forces. As for the political dummy, the coefficient for the rice price equation is the only one having statistical significance. This reflects that policy decision-making pertaining to rice price support has historically been conditioned by the political motivation of the regime in power. In view of the overwhelming importance of rice for both farm producers and consumers in Korea, the problem of determining the level of rice price support has been one of the major political issues in presidential and congressional elections.

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Appendix

Tables and Figures

Appendix 1. GNP, Exports and Imports, 1955-84

Year	GNP ('75 Constant Prices)		GNP in U.S. Dollars	Per Capita GNP		Exports	Imports
	Total	Agriculture		Nominal	Real		
	(Billion Won)		(Million US$)	(US$)		(Million US$)	(Million US$)
1955	2,423	1,182	1,414	.65	134	18	342
56	2,390	1,100	1,459	66	132	25	386
57	2,570	1,204	1,672	74	143	22	442
58	2,711	1,292	1,897	80	152	17	378
59	2,815	1,288	1,980	81	151	20	304
60	2,846	1,261	1,996	79	144	33	346
61	3,005	1,414	2,103	82	149	41	316
62	2,071	1,330	2,315	87	155	55	422
63	3,351	1,456	2,718	100	175	87	560
64	3,672	1,684	2,876	103	178	119	404
65	3,885	1,668	2,006	105	177	175	463
66	4,378	1,861	3,671	125	204	250	716
67	4,669	1,751	4,274	142	225	320	996
68	5,196	1,774	5,226	169	257	455	1,463
69	5,911	1,961	6,625	210	304	623	1,824
70	6,363	1,933	7,986	248	341	835	1,984
71	7,242	1,936	9,367	285	374	1,067	2,394
72	7,678	2,031	10,573	316	397	1,624	2,522
73	8,761	2,164	13,504	396	471	3,225	4,240

Appendix 1. (Cont.)

Year	GNP ('75 Constant Prices)		GNP in U.S. Dollars	Per Capita GNP		Exports	Imports
	Total	Agriculture		Nominal	Real		
	(Billion Won)		(Million US$)	(US$)		(Million US$)	(Million US$)
1974	9,438	2,336	18,549	535	585	4,460	6,852
75	10,092	2,496	20,852	591	591	5,081	7,274
76	11,500	2,703	28,680	800	760	7,715	8,774
77	12,976	2,817	37,429	1,028	923	10,047	10,811
78	14,233	2,850	51,960	1,406	1,176	12,710	14,972
79	15,155	2,799	62,374	1,662	1,278	15,056	20,339
80	14,359	2,074	61,203	1,605	1,130	17,505	22,292
81	15,243	2,467	67,191	1,735	1,121	21,254	26,131
82	16,239	1,408	70,797	1,800	1,093	21,853	24,251
83	17,663	2,509	75,280	1,884	1,105	24,445	26,192
84	18,979	2,642	81,073	1,999	1,124	29,245	30,631

Source: The Bank of Korea, Economic Statistics Yearbook, various issues.
Korea Development Institute, various issues.

Appendix 2. Trends in the Share in GNP of Gross Domestic Investment, Domestic Saving and Foreign Saving

Year	Gross Investment	Domestic Saving	Foreign Saving	Statistical Discrepancy
1955	12.3	5.2	7.1	-
1960	10.9	0.8	8.6	1.5
1965	15.0	7.4	6.4	1.2
1970	26.8	17.3	9.3	0.2
1975	30.0	19.1	10.1	0.8
1980	31.3	21.9	9.4	-
1984	30.0	27.4	2.3	0.3
Average for period:				
1954-56	11.0	3.3	7.7	-
1961-63	14.8	5.0	9.9	(-)0.1
1971-73	24.2	18.2	6.6	(-)0.6
1981-82	28.6	20.3	7.6	0.7

Source: The Bank of Korea, National Income Statistics, various issues.

Appendix 3. Industrial Origin of GNP and Average Annual Growth Rates for the Selected Period

Unit: Billion won at 1975 constant prices

Year	Total	Agri. & Forestry	Mining & Manufacturing	SOC. & Other Services
1955	2,423	1,182	173	1,068
1960	2,846	1,261	288	1,297
1965	3,885	1,668	508	1,709
1970	6,363	1,933	1,240	3,190
1975	10,092	2,496	2,774	4,822
1980	14,359	2,074	4,333	7,952
1984	18,979	2,642	5,834	10,503
Average Annual Growth Rate:				
1962-66	9.3	8.8	14.3	8.4
1967-71	11.6	2.5	22.3	13.7
1972-76	10.6	7.4	16.4	9.4
1977-81	4.1	(-)3.3	4.9	5.8
1962-84	8.6	3.2	13.8	9.6

Source: The Bank of Korea, National Income Statistics, various issues.

Appendix 4. Sectoral Contribution to GNP Growth, 1962-84

Unit: Billion won at 1975 constant prices

Year	Total GNP	Agri., Forestry & Fisheries	Mining & Manufacturing	SOC. & Other Services
1962	3,071	1,330	340	1,401
1984	18,979	2,642	5,834	10,503
Increase (1984-62)	15,908	1,312	5,494	9,102
Contribution	100.0%	8.3%	34.5%	57.2%

Source: The Bank of Korea, National Income Statistics, various issues.

Appendix 5. Rates of Self-Sufficiency for Major Grains

Unit: %

Year	All Grain	Rice	Barley	Soybean	Corn
1955	92.1	100.0	87.3	100.0	100.0
1960	94.5	100.8	110.4	79.3	18.9
1965	93.9	100.7	106.0	100.0	36.1
1970	80.5	93.1	106.3	86.1	18.9
1975	73.0	94.6	92.0	85.8	8.3
1980	56.0	95.1	57.6	35.1	5.9
1984	48.9	97.8	131.8	24.0	3.7

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

Appendix 6. Imports and Exports of Grain for Selected Years

Unit: 1,000 M/T

Year	Imported						Imported Total	Exported Total
	Rice	Wheat	Corn	Soybean	Barley	Others		
1955	0	51		9	23	2	85	1
1960	0	381	0	36	0	51	468	24
1965	0	496	60	0	106	7	669	26
1970	0	1,254	283	36	542	0	2,115	5
1975	481	1,584	532	61	354	0	3,012	0
1980	581	1,810	2,234	417	0		5,042	0
1984	0	2,648	3,223	694	0		6,565	0

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

Appendix 7. Government Revenues and Expenditures, 1955-84

Unit: Billion won

Year	Gov't Revenue	Gov't Expenditure	Deficit	Share in GNP			Deficit/ Expenditure	Rate of Inflation
				Revenue	Expenditure	Deficit		
1955	11.7	13.6	1.9	10.2%	11.9%	1.7%	14.0%	43.8%
56	18.3	23.2	4.9	12.1	15.3	3.2	21.1	31.4
57	30.0	32.5	2.5	15.2	16.5	1.3	7.7	16.2
58	36.2	44.4	8.2	17.7	20.7	3.0	18.5	(-)6.3
59	39.4	42.2	2.8	18.1	19.4	1.3	6.6	2.4
60	41.4	44.6	3.2	16.9	18.2	1.3	7.2	11.6
61	49.5	58.8	9.3	17.0	21.2	3.2	5.4	13.8
62	67.2	85.7	18.5	18.9	24.1	5.2	21.6	8.8
63	72.4	82.0	9.6	14.4	16.3	1.9	11.7	20.5
64	77.4	82.4	5.0	10.8	11.5	0.7	6.1	35.1
65	97.5	102.3	4.8	12.1	12.7	0.6	4.7	10.3
66	144.1	160.7	16.6	13.9	15.5	1.6	10.3	8.6
67	183.2	210.1	26.9	14.3	16.4	2.1	12.8	6.5
68	264.4	312.4	48.0	16.0	18.9	2.9	15.4	8.1
69	344.8	437.5	92.7	16.0	20.3	4.3	21.2	6.9
70	487.6	512.3	24.7	17.8	18.7	0.9	4.8	9.4
71	565.7	642.1	76.4	16.8	19.0	2.2	11.0	8.6
72	654.0	846,5	192.5	15.7	20.3	4.6	22.7	13.8
73	757,7	844.7	87.0	14.1	15.7	1.6	10.3	6.9

Appendix 7. (Cont.)

Unit: Billion won

Year	Gov't Revenue	Gov't Expenditure	Deficit	Share in GNP			Deficit/ Expenditure	Rate of Inflation
				Revenue	Expenditure	Deficit		
1974	1,117.7	1,418.6	300.9	14.9	18.9	4.0	21.2	42.1
75	1,692.5	2,158.6	466.1	16.9	21.6	4.7	21.6	26.5
76	2,511.4	2,909.7	398.3	18.1	21.0	2.9	13.7	12.2
77	3,184.9	3,660.5	475.6	17.6	20.2	2.6	13.0	9.0
78	4,385.2	5,001.0	615.8	18.1	20.6	2.5	12.3	11.6
79	5,769.8	6,210.1	440.3	18.5	19.9	1.4	7.1	18.8
80	7,280.8	8,454.5	1,173.7	19.5	22.7	3.2	13.9	38.9
81	9,246.7	11,357.6	2,110.9	20.2	24.8	4.6	18.6	20.4
82	10,074.3	12,296.4	2,222.1	19.4	23.7	4.3	18.1	4.7
83	11,595.5	12,546.1	950.6	19.9	21.5	1.6	7.6	0.2
84	13,039.6	13,962.5	922.9	20.0	21.4	1.4	6.6	0.7

Source: Economic Planning Board, Korea Statistics Yearbook, various issues.
Ministry of Finance, Annual Report an Government Financing, various issues.

Appendix 8. Share in GDP and Gross Investment of of Public Enterprises

Unit: %

Year	Share in Total GDP	Share in Non-agr. GDP	Share in Gross Investment
1970	9.2	13.0	18.9
1975	8.3	11.3	33.2
1980	9.6	11.6	27.6

Source: Sagong, I. and Song, D.H., Improving Public Enterprises Management, Korea Development Institute, 1982.

Appendix 9a. Indices of Agricultural Output for Food and Non-Food Products (1979-80=100)

Year	Food						Non-Food Total[b/]	Total Food/ Total Non-Food
	Grains	Vegetables	Fruits	Edible Oil	Livestock	Total[a/]		
Weight	477.3	204.7	36.1	13.2	194.1	926.7	73.3	
1960	68.9	12.8	11.7	10.0	19.1	39.6	52.6	.752
61	78.2	15.8	10.7	13.2	19.3	44.4	56.6	.784
62	70.6	17.0	14.0	14.5	19.9	41.9	54.9	.763
63	77.7	15.9	12.7	14.9	23.8	45.8	57.9	.791
64	92.6	20.5	16.5	19.5	24.8	54.0	71.0	.761
65	89.8	21.3	22.4	22.1	21.5	52.6	67.1	.785
66	97.3	27.3	24.2	29.5	22.4	58.3	83.2	.700
67	88.1	29.1	26.1	35.1	23.6	55.1	79.0	.697
68	86.6	34.0	29.2	39.1	27.6	57.2	83.7	.683
69	99,7	33.9	31.1	47.8	36.7	65.8	91.9	.716
70	96.2	32.8	31.9	55.6	38.3	64.6	89.3	.723
71	95.2	40.0	30.0	68.2	39.1	65.9	93.5	.705
72	94.4	38.9	38.7	65.4	43.8	69.2	117.7	.588
73	96.6	38.8	47.3	71.5	49.2	70.1	122.7	.571
74	100.2	40.8	52.1	78.5	56.7	74.7	117.6	.635
75	109.3	63.9	56.9	111.3	49.8	83.2	123.4	.674
76	117.8	80.8	61.6	155.6	68.8	95.8	118.8	.806
77	122.1	83.9	80.8	134.2	71.1	100.2	119.3	.840
78	121.9	76.2	84.8	143.5	92.2	103.3	113.1	.913
79	118.5	109.4	93.1	130.7	103.9	111.4	108.4	1.028
80	77.8	98.3	91.9	76.8	90.1	85.4	100.5	.850
81	104.3	97.8	114.6	92.5	103.3	102.8	94.9	1.083
82	104.0	101.9	133.8	153.4	118.8	108.6	101.4	1.071
83	108.1	111.9	158.8	177.1	154.6	121.5	97.9	1.241
84	112.1	91.5	139.6	196.1	164.1	120.8	106.4	1.135

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

a/ Mushroom also included in the category of food..

b/ Non-food includes leaf tobacco, ginseng, cocoon, cotton, medicinal crops, hop and straw.

Appendix 9b. Indices of Agricultural Output for Tradable and Non-Tradable Products (1979-81=100)

Year / Weight	Tradable (Importable)						Non-Tradable[a/] (2)	(1)/(2)
	Rice	Barley	Soybean	Beef	Pork	Total (1)		
	372.6	38.4	17.9	47.0	67.7	1,000.0		
1960	64.5	124.4	52.4	27.9	29.7	41.2	51.5	.800
61	73.3	122.4	67.7	32.7	28.2	45.9	47.1	.975
62	63.8	114.0	64.0	40.3	28.6	43.5	46.7	.931
63	79.5	76.3	64.2	46.9	33.8	47.4	45.4	1.044
64	83.7	125.6	66.9	72.0	29.8	56.1	49.9	1.124
65	74.1	149.4	71.7	55.9	26.8	54.6	63.1	.865
66	82.9	167.0	66.3	51.9	27.8	61.1	63.5	.962
67	76.2	158.7	82.8	49.5	29.2	56.9	58.5	.973
68	67.6	171.9	100.8	39.4	28.9	59.1	72.6	.814
69	86.6	170.5	94.1	69.5	32.6	67.7	73.4	.922
70	83.4	162.9	95.3	83.9	28.4	66.4	83.5	.795
71	84.6	154.3	91.3	64.1	36.4	68.0	87.5	.777
72	83.7	163.6	92.0	84.1	34.5	70.7	87.8	.805
73	89.1	147.3	101.0	111.4	43.0	74.0	87.0	.851
74	94.1	141.6	130.9	152.4	42.8	77.8	90.0	.864
75	98.8	173.4	127.6	56.5	40.5	86.1	95.3	.903
76	110.3	177.7	121.2	91.8	70.2	97.5	100.5	.970
77	127.1	81.2	130.9	117.9	58.1	101.6	99.4	1.022
78	122.7	133.3	120.3	128.1	82.5	104.0	110.3	.943
79	117.8	147.0	105.6	111.9	119.3	111.1	102.4	1.085
80	75.1	74.1	88.9	95.4	83.2	86.5	93.7	.923
81	107.1	78.9	105.5	92.6	97.5	102.3	103.9	.985
82	109.5	68.6	95.9	110.6	121.5	108.0	103.3	1.045
83	114.3	75.4	93.0	156.6	169.1	119.8	117.1	1.023
84	120.2	68.8	104.2	187.8	156.8	119.7	115.3	1.038

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

a/ Non-tradable goods mean agricultural services whose share of total value added in agriculture is only about 2.2%.

Appendix 10. Government Revenues and Expenditures for Selected Years

Unit: Billion won

Year	Gov't Ravenues	Gov't Expenditures	Budget Deficit	Share of Deficit in Total Budget	Share of Deficit in GNP	Rate of Inflation
1955	11.7	13.6	1.9	14.0%	1.7%	43.8%
1960	41.4	44.6	3.2	7.2	1.3	11.1
1965	97.5	102.3	4.8	4.7	0.6	10.3
1970	487.6	512.3	24.7	4.8	0.9	9.4
1975	1,692.5	2,158.6	466.1	21.6	4.7	26.5
1980	7,280.8	8,454.5	1,173.7	13.9	3.2	38.9
1984	13,039.0	13,962.5	922.9	6.6	1.4	0.7

Source: Korea Statistics Yearbook, The Economic Planning Board, 1955-84.

Appendix 11. Estimation of Tariff Equivalent(tm), 1960 ~ 84

YEAR	P_m^d/P_x^d a)	P_m^f/P_x^f b)	$\frac{P_m^d}{P_x^d}/\frac{P_x^f}{P_m^f}$	Export subsidy 1+ts c)	(A) X (B)	Tariff equivalent 1+tm=1.1654X(C) d)
	(1968=100.0)	(1968=100.0)	(A)	(B)	(C)	
1960	1.061	na	na	2.362	na	1.500
61	1.082	na	na	1.181	na	1.500
62	1.076	na	na	1.165	na	1.500
63	1.099	1.239	0.887	1.457	1.292	1.506
64	1.102	1.226	0.899	1.313	1.180	1.375
65	1.218	1.202	1.013	1.148	1.163	1.355
66	1.147	1.077	1.065	1.192	1.269	1.479
67	1.094	1.040	1.052	1.229	1.293	1.507
68	1.000	1.000	1.000	1.282	1.282	1.494
69	0.976	1.001	0.975	1.278	1.246	1.452
70	0.963	1.029	0.936	1.283	1.201	1.400
71	na	1.037	na	1.296	na	1.400
72	na	1.008	na	1.268	na	1.400
73	na	1.062	na	1.238	na	1.400
74	na	1.305	na	1.211	na	1.400
75	na	1.499	na	1.167	na	1.330
76	na	1.271	na	1.157	na	1.330
77	na	1.228	na	1.110	na	1.330
78	1.200	1.171	1.025	1.049	1.076	1.254
79	na	1.196	na	1.007	na	1.254
80	na	1.380	na	1.062	na	1.254
81	na	1.410	na	1.042	na	1.254
82	1.283	1.352	0.949	1.041	0.988	1.151
83	na	1.338	na	1.030	na	1.151
84	na	1.311	na	1.025	na	1.151

Source: Economic Planning Board, Major Statistics of Korean Economy, various issues.
Korea Development Institute, Stabilization Measures and Restructuring Export Support System (Unpublished), 1985.
Frank, Kim and Westphal, Trade and Development in Korea, Seoul, 1975.

a) P_m^d/P_x^d = Index of domestic prices of imported goods/Index of domestic prices of exportable goods(1968=100.0)
b) P_m^f/P_x^f = Index of import prices(CIF)/Index of export prices(FOB).
c) 1 + ts = 1+actual export subsidy ratio(export subsidy per dollar export)
d) Tariff equivalent of 19.4% estimated for 1963 by Frank, Kim and Westphal (Trade and Development in Korea, 1975) was used as a base to estimate those for 1963-70 period, 1978 and 1982, and those for other years are guess estimates.

$$(1+tm)t = (1+ts)t\left(\frac{P_m^d}{P_x^d}/\frac{P_x^f}{P_m^f}\right)_t \times 1.1654$$

where: $1.1654 = \frac{(1+tm)1968}{(1+ts)1968} = \frac{1+0.494}{1+0.282} = 1.1654$

Appendix 12. Estimation of Free Trade Equilibrium Foreign Exchange Rates (E*), 1960-84

YEAR	Tariff Equivalent 1+tm	Foreign Exchange Demand a) Qd	Export Subsidy Rate 1+ts	Foreign Exchange Supply b) Qs	Foreign Exchange Deficit ΔQo	Exchange Rate c) E^*
		(million US $)		(million US $)	(million US$	(Won/US $)
1960	1.500	379	2.302	117	262	176
61	1.500	344	1.181	146	198	258
62	1.500	455	1.165	163	292	296
63	1.506	578	1.457	176	402	338
64	1.375	432	1.313	211	221	414
65	1.355	488	1.148	290	198	434
66	1.479	778	1.192	455	323	452
67	1.507	1,064	1.229	643	421	448
68	1.494	1,547	1.282	880	667	484
69	1.452	1,945	1.278	1,151	794	489
70	1.400	2,182	1.283	1,379	803	507
71	1.400	2,634	1.296	1,616	1,018	578
72	1.400	2,768	1.268	2,227	541	540
73	1.400	4,620	1.236	4,121	499	503
74	1.400	7,459	1.211	5,388	2,071	579
75	1.330	7,997	1.167	5,884	2,113	678
76	1.330	10,120	1.157	9,457	663	571
77	1.330	13,284	1.140	13,074	210	546
78	1.254	18,718	1.049	17,161	1,557	556
79	1.254	24,121	1.067	19,531	4,590	619
80	1.254	28,347	1.062	22,577	5,770	784
81	1.254	32,416	1.042	27,269	5,147	813
82	1.151	31,504	1.041	28,064	3,204	835
83	1.151	32,581	1.030	30,383	2,198	850
84	1.151	35,563	1.025	33,651	1,912	867

Source: The Bank of Korea, Economic Statistics Yearbook, various issues, Nam, Sang Woo, Semi-Annual Model of the Korean Economy, The Korea Dvelopment Institute, September, 1985.

a) Includes imports of goods and services only, i.e. excludes unrequitted transfers such as donations, and repayments of foreign loans, interest payments, with dravals of foreign investors

b) Includes imports of goods and services only, i.e. excludes inflow of foreign aids, foreign loan, relief aids, foreign investment.

c) Estimation of E^* is based on the following formular:

$$E^* = \left[\frac{\Delta Qo + \left(\frac{tm}{1+tm} \eta dQd + \frac{ts}{1+ts} \epsilon sQs \right)}{\eta dQd + \epsilon sQs} + 1 \right] Eo$$

where: Eo = Nominal exchange rate
ηd = Elasticity of foreign exchange demand w/r to exchange rate (Estimated as 0.225 by Nam, Sang Woo, KDI, 1985)
ϵs = Elasticity of foreign exchange supply w/r to exchange rate (Estimated as 1.03 by Nam, Sang Woo, KDI, 1985)

Appendix 13. Adjusted Price Indices, 1960-84 a/

Year	WPI_F	CPI_A	CPI_K	P_{NA}	P^*_{NA}
1960	38.2	14.0	6.1	7.7	7.5
61	38.4	11.9	6.6	8.3	10.9
62	38.3	13.7	7.1	8.7	12.2
63	38.6	19.0	8.5	9.5	13.7
64	38.9	19.4	11.0	11.8	15.1
65	39.5	18.7	12.5	14.2	16.9
66	40.6	23.7	14.0	17.0	19.3
67	40.9	23.1	15.4	19.0	21.2
68	41.5	26.6	17.1	21.1	24.1
69	42.8	29.3	19.2	23.1	26.1
70	44.5	32.8	22.3	25.6	28.5
71	45.5	37.9	25.3	27.4	30.9
72	46.9	36.4	28.3	30.2	21.0
73	52.9	35.4	29.2	31.4	31.0
74	65.0	48.9	36.3	38.0	40.4
75	69.3	58.2	45.2	45.1	47.4
76	73.1	59.2	52.1	51.1	50.1
77	76.9	62.4	57.4	55.6	53.6
78	79.6	71.9	65.7	62.5	62.5
79	87.5	91.2	77.7	76.6	75.7
80	100.0	118.1	100.0	100.0	104.3
81	106.7	138.4	121.3	117.0	118.3
82	110.2	142.5	130.1	129.7	131.6
83	111.3	143.2	134.5	136.0	136.3
84	114.1	144.9	137.6	139.8	139.1

Source: Economic Planning Board, Consumer Price Statistics, various issues.
The Bank of Korea, Economic Statistics Yearbook, various issues.
Korea Development Institute, various unpublished issues.

a/ WPI_F = Weighted average of Korea's major trading partners' WPI

CPI_A = Domestic CPI adjusted to exchange rate rate over-valuation
= $(E^*/E_o)\, P_T + (1-\alpha)P_{NT}$

CPI_K = Domestic CPI (1980 = 100.0)

P_{NA} = Nonagricultural CPI (1980 = 100.0)

P^*_{NA} = Nonagricultural CPI adjusted to exchange rate over-valuation
= $(E^*/E_o)\beta P^T_{NA}/(1+t_{na}) + (1-\beta)P^{NT}_{NA}$

Appendix 14. Indices of Prices of Tradables and Nontradables in CPI[a/]
1960-84

Year	α	β	P_T	P_{NT}	P^T_{NA}	P^{NT}_{NA}
1960	.6976	.4354	6.10	6.26	10.33	5.68
61	.6976	.4354	6.61	6.71	11.09	6.10
62	.6976	.4354	7.05	7.14	11.46	6.49
63	.6976	.4354	8.84	7.82	12.64	7.10
64	.6976	.4354	11.92	9.03	16.51	8.20
65	.6843	.4375	13.32	10.75	19.93	9.76
66	.6843	.4375	14.41	12.98	21.80	13.17
67	.6843	.4375	15.74	14.75	24.18	14.96
68	.6843	.4375	17.19	16.90	26.32	17.07
69	.6843	.4375	19.36	18.97	26.32	19.20
70	.6843	.4375	22.38	22.21	29.68	22.50
71	.6843	.4375	25.51	24.97	31.17	25.17
72	.6843	.4375	28.28	28.36	32.99	28.56
73	.6843	.4375	29.27	29.05	34.82	29.25
74	.6843	.4375	36.93	34.95	42.82	35.09
75	.6197	.3830	46.97	42.26	49.61	42.36
76	.6197	.3830	53.64	49.60	54.01	49.29
77	.6197	.3830	59.02	54.71	58.17	54.02
78	.6197	.3830	67.72	62.28	64.20	61.48
79	.6197	.3830	78.44	76.42	77.68	76.01
80	.6197	.3830	100.00	100.00	100.00	100.00
81	.6197	.3830	123.50	117.82	116.42	117.33
82	.6197	.3830	128.64	132.37	125.97	132.02
83	.6197	.3830	130.75	140.67	129.16	140.26
84	.6197	.3830	132.26	146.25	130.27	145.65

Source: Economic Planning Board, Consumer Price Statistics, various issues.

a/ α = Share of tradables in CPI

β = Share of tradables in nonagricultural CPI

P_T = Index of prices of tradables in CPI

P_{NT} = Index of prices of nontradables in CPI

P^T_{NA} = Index of prices of tradables in nonagricultural CPI

P^{NT}_{NA} = Index of prices of nontradables in nonagricultural CPI

Appendix 15. Transfer Receipts and Capital Inflow

Unit : million US. dollars

Year	Net Transfer			Net Capital Inflow	Total Inflow	Total Imports	Net Inflow/Imports
	Foreign Aid	Remittence & Others	Sub-total				
1960	232	40	272	-	272	379	.718
61	197	51	248	-	248	344	.721
62	219	17	236	5	241	455	.530
63	233	26	259	64	323	578	.559
64	143	52	195	22	217	432	.502
65	136	71	207	47	254	488	.520
66	144	76	220	196	416	778	.535
67	119	110	229	210	439	1064	.413
68	126	101	227	314	541	1547	.350
69	121	124	245	568	813	1945	.418
70	161	19	180	536	716	2182	.328
71	106	64	170	556	726	2634	.276
72	22	148	170	524	694	2768	.251
73	-	190	190	591	781	4620	.169
74	-	232	232	733	965	7459	.129
75	-	226	226	1060	1286	7997	.161
76	-	349	349	1302	1651	10120	.163
77	-	222	222	1496	1718	13284	.129
78	-	472	472	2053	2525	18718	.135
79	-	439	439	1627	2066	24121	.086
80	-	449	449	1896	2345	28347	.083
81	-	501	501	1793	2294	32416	.071
82	-	554	554	1449	2003	31504	.064
83	-	578	578	1052	1630	32581	.050
84	-	540	540	957	1497	35563	.042

Source : The Bank of Korea, Economic Statistics Yearbook, various issues.

Appendix 16. Proportion of Total Agricultural Land by Farm Size

Unit: %

Year	Under 0.3 ha	0.3-0,5	0.5-1.0	1.0-1.5	1.5-2.0	2.0-3.0	Over 3.0 ha
1960	5.3	11.4	27.9	37.0	37.0	17.3	1.2
61	5.1	10.6	28.7	37.1	37.1	17.4	1.1
62	5.4	10.6	29.6	36.4	36.4	16.7	1.3
63	5.5	10.6	28.9	36.5	36.5	16.8	1.6
64	5.1	10.0	28.3	36.8	36.8	17.0	2.7
65	3.8	8.6	26.7	22.9	17.6	15.3	5.1
66	3.7	8.4	27.0	23.5	16.8	14.7	6.0
67	3.6	8.2	27.0	23.9	16.4	14.2	6.7
68	3.5	8.1	26.7	24.3	16.2	14.0	7.2
69	3.4	8.0	26.7	24.5	16.3	14.0	7.0
70	3.4	7.3	27.8	25.2	15.4	13.6	7.3
71	3.4	8.0	27.3	25.3	15.8	13.4	6.8
72	3.5	8.0	27.4	25.5	15.7	13.2	6.7
73	3.4	8.0	26.8	25.3	16.1	13.3	7.0
74	2.9	7.0	28.3	25.2	16.0	13.4	7.2
75	3.0	7.2	29.6	25.3	15.5	12.8	7.0
76	3.1	7.2	29.7	25.4	15.0	12.5	6.8
77	3.2	7.5	29.8	25.4	15.0	12.2	6.5
78	2.9	7.9	30.2	26.0	15.2	11.9	6.4
79	3.2	8.0	30.4	26.0	15.0	11.5	6.0
80	2.9	6.6	27.8	27.0	16.4	12.8	6.5
81	3.0	7.7	30.8	26.7	15.1	11.1	5.6
82	2.9	7.4	20.5	27.1	15.5	11.2	5.4
83	2.9	7.4	30.3	27.2	15.6	11.2	5.4
84	2.8	7.2	30.0	27.4	15.8	11.4	5.4

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

Appendix 16a. Producer Prices of Major Agricultural Products

Unit: ₩1,000/MT

Year	Rice	Barley	Soybean	Beef	Pork
1960	16.4	10.6	15.0	81	56
61	20.3	14.5	15.2	89	64
62	21.6	16.2	16.3	95	91
63	34.4	28.3	27.2	102	87
64	42.8	37.0	41.7	119	125
65	40.1	27.9	43.5	193	156
66	42.3	26.5	48.9	227	141
67	46.6	30.6	65.0	291	191
68	54.9	33.5	45.5	376	276
69	67.9	38.9	49.6	401	228
70	76.3	42.4	76.8	471	291
71	95.9	58.8	79.3	571	357
72	121.8	75.2	99.1	752	322
73	127.6	77.0	116.3	812	457
74	184.4	97.3	143.2	913	529
75	233.2	136.4	175.7	1,001	778
76	278.0	138.9	238.4	1,662	1,038
77	282.7	188.7	314.5	2,158	1,058
78	382.9	214.6	335.2	3,035	1,650
79	428.4	247.6	254.3	2,984	1,312
80	562.6	317.7	528.2	3,616	1,778
81	656.7	368.3	766.7	5,360	3,090
82	682.1	417.7	727.2	6,517	3,073
83	686.8	430.2	306.7	7,184	2,750
84	704.5	443.6	797.9	6,760	2,196

Source: The Bank of Korea, Price Survey, various issues.
National Agricultural Cooperatives Federation, Rural Price and Wage Survey, various issues.
Union of Livestock Cooperatives, Demand & Supply of Livestock Products, various issues.

Appendix 16b. Consumer Prices of Major Agricultural Products

Unit: ₩1,000/MT

Year	Rice	Barley	Soybean	Beef	Pork
1960	19.0	12.6	17.1	128	70
61	22.9	17.0	17.0	152	80
62	23.6	18.1	17.7	163	97
63	37.6	28.9	28.7	172	105
64	46.0	39.1	42.4	200	143
65	43.6	32.0	44.9	265	193
66	44.9	31.6	51.8	297	205
67	49.3	36.1	70.5	350	243
68	56.8	34.1	47.8	568	342
69	66.6	37.3	57.3	672	357
70	77.2	46.4	83.4	772	372
71	93.5	59.9	90.0	940	517
72	131.2	71.8	116.0	1,093	523
73	132.1	75.0	126.3	1,145	610
74	174.6	79.4	158.6	1,342	713
75	228.8	108.9	196.1	1,597	1,090
76	274.0	128.5	278.3	2,242	1,400
77	295.5	169.6	353.1	2,870	1,435
78	321.6	185.4	388.3	3,133	1,893
79	403.1	175.0	438.4	3,522	1,838
80	622.6	202.6	612.1	4,670	2,233
81	789.0	335.1	859.9	6,578	3,713
82	825.8	301.0	875.9	7,432	3,645
83	798.7	384.1	984.1	8,318	3,328
84	806.8	420.5	1,016.8	7,902	2,567

Source: Economic Planning Board, Consumer Price Statistics, various issues.

Appendix 16c. Agricultural Production

Unit: ₩1,000/MT

Year	Rice	Barley	Soybean	Wheat	Corn	Beef	Pork
1960	3,150	1,098	138	164	14	13.0	58.0
61	3,047	1,110	130	159	14	13.3	60.0
62	3,463	1,113	165	164	16	16.8	38.0
63	3,015	746	156	139	18	21.1	55.3
64	3,758	1,227	156	190	20	31.9	62.5
65	3,954	1,459	163	184	35	27.3	55.9
66	3,501	1,632	174	193	40	29.4	95.8
67	3,919	1,550	161	191	34	32.0	72.2
68	3,603	1,680	201	211	60	35.8	61.8
69	3,195	1,666	245	224	63	33.1	76.8
70	4,090	1,591	229	219	63	37.3	82.5
71	3,939	1,510	232	196	68	39.5	89.9
72	3,997	1,600	222	149	64	40.2	94.0
73	3,957	1,443	224	100	54	44.9	91.9
74	4,212	1,388	246	74	61	51.5	95.1
75	4,445	1,700	319	97	58	70.3	106.8
76	4,669	1,759	311	82	60	74.8	118.2
77	5,215	814	295	45	84	77.4	151.2
78	6,006	1,348	319	36	113	74.3	171.6
79	5,797	1,508	293	42	100	86.5	223.0
80	5,565	811	257	92	149	93.1	235.2
81	3,550	859	216	57	154	69.3	209.3
82	5,063	749	257	66	145	61.5	237.5
83	5,175	815	233	115	117	66.1	294.9
84	5,404	804	226	21	101	91.0	340.9

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.
Union of Livestock Cooperatives, Demand & Supply of Livestock Products, various issues.

Appendix 16d Consumption of Agricultural Products

Unit: 1,000/MT

Year	Rice	Barley	Soybean	Wheat	Corn	Beef	Pork
1960	3,126	995	174	484	74	13.0	58.0
61	3,092	1,230	148	399	70	13.3	60.0
62	3,407	1,235	185	593	52	16.8	38.0
63	3,136	1,166	166	978	107	21.1	55.1
64	3,709	1,017	165	777	84	31.9	62.5
65	3,925	1,377	163	682	97	27.3	55.9
66	3,532	1,488	174	651	73	29.4	95.8
67	3,954	1,719	185	991	77	32.0	72.2
68	3,822	1,702	223	1,342	158	35.8	61.8
69	3,946	1,742	262	1,479	244	33.1	76.1
70	4,394	1,497	266	1,421	333	37.3	82.5
71	4,777	1,644	281	1,656	365	39.5	80.9
72	4,362	1,717	261	2,033	465	40.2	90.2
73	4,296	1,740	298	1,896	437	44.9	90.1
74	4,641	1,771	291	1,497	594	51.5	95.4
75	4,699	1,848	372	1,704	697	70.3	98.8
76	4,646	1,796	418	1,816	894	75.5	109.0
77	5,045	1,523	437	1,981	1,353	81.6	141.3
78	5,784	1,125	538	1,691	1,890	114.7	178.0
79	6,764	1,286	675	1,741	2,914	113.8	225.3
80	5,402	1,407	733	1,924	2,517	100.0	235.2
81	5,366	1,182	727	2,098	2,533	93.2	209.3
82	5,404	872	792	1,950	2,930	106.5	237.5
83	5,303	696	907	1,924	4,228	115.5	294.9
84	5,526	814	940	2,724	3,305	106.5	340.9

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.
Union of Livestock Cooperatives, Demand & Supply of Livestock Products, various issues.

Appendix 16e. Trade of Agricultural Products

Unit: 1,000/MT

Year	Import							Export		
	Rice	Barley	Soybean	Wheat	Corn	Beef	Pork	Rice	Barley	Pork
1960	-	-	36	390	60	-	-	24	-	-
61	-	121	22	354	56	-	-	6	42	-
62	-	30	16	398	36	-	-	62	431	-
63	118	170	10	815	89	-	-	6	42	0.2
64	-	151	9	607	64	-	-	14	97	-
65	-	71	-	496	62	-	-	1	7	-
66	32	-	-	460	33	-	-	63	437	-
67	113	-	29	909	49	-	-	-	-	-
68	216	106	17	1,026	131	-	-	-	-	-
69	755	67	24	1,369	174	-	-	-	-	0.7
70	541	-	36	1,254	284	-	-	-	-	-
71	907	-	61	1,384	315	-	-	-	-	-
72	584	254	31	1,778	422	0.3	-	-	-	3.8
73	437	350	73	1,772	456	-	-	-	-	1.8
74	206	299	66	1,427	573	-	0.3	-	-	4.0
75	481	354	61	1,584	532	-	0.4	-	-	8.4
76	168	-	119	1,857	890	0.7	-	-	-	4.6
77	-	322	151	1,979	1,370	6.4	-	-	-	5.0
78	-	-	223	1,578	1,791	44.4	8.6	80	-	-
79	501	-	422	1,642	2,881	31.7	7.3	-	-	0.3
80	580	-	417	1,810	2,234	-	-	-	-	0.2
81	2,245	-	529	2.095	2,355	24.7	-	-	-	-
82	269	-	535	1,940	2,814	41.5	-	-	-	-
83	216	-	724	1,861	4,167	51.0	-	-	-	-
84	-	-	694	2,648	3,223	24.0	-	135	-	0.3

Source: Ministry of Agriculture and Fisheries, Statistics for Grain Management, various issues.
Union of Livestock Cooperatives, Demand & Supply of Livestock Products, various issues.

Appendix 17. Share in Total Agricultural Output Value of Specified Products

Unit: %

Year	Total	Food Crops					Fruits	Vegetables	Livestock	Special Crops[b]
		Sub-Total	Rice	Barley	Soybean	Other Cereals[a]				
1961	100.0	83.9	59.3	16.9	1.2	6.5	0.8	3.6	5.3	6.4
1965	100.0	64.5	38.2	12.4	2.1	11.8	2.4	9.5	11.2	12.4
1970	100.0	57.0	37.4	11.0	2.2	6.3	2.7	13.2	14.1	13.0
1975	100.0	57.5	40.1	8.8	2.8	5.8	4.2	15.2	11.3	11.8
1980	100.0	44.5	34.1	4.2	1.8	4.4	3.9	22.6	19.1	9.9
1984	100.0	43.2	35.8	3.1	1.8	2.5	5.1	14.8	27.6	9.3

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

a/ Includes pulses, potatoes and other miscellaneous cereals.
b/ Includes tobacco, ginseng, fibre crops, oil crops, coccoon, etc.

Appendix 18. Share in Total Planted Acreage of Specified Products[a/]

Unit: %

Year	Total	Food Crops					Fruits	Vegetables	Special Crops[c/]
		Sub-Total	Rice	Barley	Soybean	Other Cereals[b/]			
1961	100.0	89.6	36.9	31.4	9.5	11.8	0.7	3.8	5.9
1965	100.0	90.4	34.5	33.7	8.7	13.5	1.2	4.3	4.1
1970	100.0	84.8	34.6	30.9	8.6	10.7	1.7	7.2	6.3
1975	100.0	80.2	38.7	24.2	9.9	7.4	2.4	7.8	9.6
1980	100.0	71.7	44.6	13.0	6.8	7.3	3.6	13.0	11.8
1984	100.0	70.9	45.5	12.8	8.6	4.0	4.0	11.7	14.0

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

a/ Data does not include the planted acreage of feed crops.
b/ Includes pulses, potatoes and other miscellaneous cereals.
c/ Includes tobacco, ginseng, fibre crops, oil crops, etc.

Appendix 19. Irrigation Status

Unit: 1,000 ha

Year	Total Cultivated Acreage	Paddy Acreage	Irrigated Paddy	(C)/(A)	(C)/(B)
	(A)	(B)	(C)	%	%
1955	1,995	1,187	497	20.4	34.3
1960	2,025	1,206	499	24.6	41.4
1965	2,256	1,286	538	23.8	41.8
1970	2,298	1,284	745	32,4	58.0
1975	2,240	1,277	790	35.3	61.9
1980	2,196	1,307	893	40.7	68.3
1984	2,152	1,320	947	44.0	71.7

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

Appendix 20. Cultivated Acreage, Rural Population, Number of Farm Households and Average Farm Size

Year	Cultivated Acreage	Rural Population	No. of Farm Households	Average Size of Holdings	Average Size of Farm Family
	(1000 ha)	(1000)	(1000)	(ha)	(Person)
1965	2,275	15,812	2,507	0.91	6.3
1970	2,295	14,432	2,483	0.93	5.8
1975	2,240	13,244	2,397	0.94	5.6
1980	2,196	10,827	2,155	1.02	5.0
1984	2,152	9.015	1,974	1.09	4.6

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

Appendix 21. Distribution of Farm Household by Size of Holding for Selected Years

Year	Total	0.5 ha or less	0.5 - 1.0 ha	1.0 - 1.5 ha	1.5 - 2.0 ha	2.0 - 3.0 ha	3.0 ha or more
1965	100.0	35.8	31.6	16.5	9.3	5.6	1.2
1970	100.0	31.6	34.3	18.5	8.0	5.1	1.5
1975	100.0	30.3	36.2	18.9	8.2	4.8	1.6
1980	100.0	28.8	35.0	20.6	9.4	5.1	1.5
1984	100.0	28.8	36.8	20.3	8.4	4.4	1.2

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

Appendix 22. Farmland Acreage under Tenancy

Unit: 1,000 ha

Year	Total Acreage	Rented Acreage	(B)/(A)
	(A)	(B)	%
1965	2,256	370	16.4
1970	2,317	408	17.6
1975	2,240	307	13.7
1980	2,196	461	21.3
1983	2,167	581	26.8

Source: Ministry of Agriculture and Fisheries, Farmland Bureau, various issues.

Appendix 23. Land Tenure Status for Selected Years (By Type of Ownership)

Year	Total	Owner Operator	Partial Tenant	Full Tenant
1975	100.0	65.6	30.3	4.1
1980	100.0	55.9	39.6	4.5
1983	100.0	40.2	56.9	2.3

Source: Ministry of Agriculture and Fisheries, Farmland Bureau, various issues.

Appendix 24. Fertilizer Production and Consumption, 1965-84 (Nutrient Basis)

Year	Production	Consumption	
		Total	per Ha
	(1,000/MT)	(1,000/MT)	kg/ha
1965	75	393	118
1970	590	563	162
1975	860	886	282
1980	1,345	828	285
1984	1,394	792	281

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.

Appendix 25. Fertilizer Price Subsidies, 1970-84,
(Manufacturers v.s. Farmers)

Unit: 1,000 won/M/T

Year	Gov't Purchase Price[a/]	Handling Costs	Sale Price[b/]	Export Price[c/]	Subsidy Rate for Manufacturers[d/]	Subsidy Rate for Farmers[e/]
	(A)	(B)	(C)	(D)	%	%
1970	24.8	2.7	23.7	16.0	55.0	(-)31.3
1971	26.7	3.4	22.9	21.4	24.8	8.8
1972	28.2	3.7	22.3	25.0	12.8	25.6
1973	31.1	3.3	24.7	34.5	(-)9.9	38.0
1974	49.3	3.9	31.6	27.3	80.6	(-)1.5
1975	78.2	6.0	51.1	37.8	106.9	(-)19.3
1976	86.0	7.2	93.8	48.6	77.0	(-)78.2
1977	93.2	8.0	87.0	55.4	68.2	(-)42.6
1978	107.0	10.1	89.9	66.5	60.9	(-)20.0
1979	128.9	19.2	92.3	87.6	47.1	16.6
1980	191.3	20.4	123.1	145.1	31.8	29.2
1981	237.0	19.3	178.2	154.7	53.2	(-)2.7
1982	229.9	24.1	193.6	125.9	82.2	(-)34.6
1983	214.5	25.0	195.8	119.0	80.3	(-)43.5
1984	214.2	26.2	206.6	144.5	48.2	(-)24.8

Source: Ministry of Agriculture and Fisheries, Fertilizer Division, various issues.

a/ Prices received by manufacturers.
b/ Prices paid by farmers.
c/ Fob price at the major port (evaluated at nominal exchange rate)
d/ (A/D - 1) X 100
e/ $\left(\frac{C - B}{D} - 1\right) \times 100$

Appendix 26. Financial Deficit in Fertilizer Account, 1975-84

Unit: Billion won

Year	Total Sales Proceeds	Total Gov't Payment	Misc. Costs[a/]	Misc. Revenue[b/]	Annual Deficit	Accumulated Deficit
1975	99.1	152.2	17.6	0.7	70.0	130.1
1976	126.5	105.6	19.3	0.5	(-)2.0	101.1
1977	144.6	130.9	19.1	2.9	2.6	103.5
1978	170.3	168.9	26.2	5.1	19.7	123.2
1979	166.9	188.1	34.2	7.1	48.3	171.5
1980	195.4	234.6	90.9	4.4	125.7	297.2
1981	290.6	359.3	99.8	6.4	162.3	459.5
1982	241.7	265.8	99.4	6.5	117.0	576.5
1983	280.6	292.5	92.5	6.7	97.7	674.2
1984	304.2	312.1	97.4	67.8	37.5	711.7

Source: Ministry of Agriculture and Fisheries, Fertilizer Division, various issues.

a/ Includes handling, transportation costs and export subsidy.
b/ Compensation from general budget account.

Appendix 27. Government Purchase Price for Rice, 1969-84

Year	Nominal Price (won/80kg)	Rate of Increase (%)	Real Price[a/] (won/80kg)	Rate of Increase (%)
1969	5,150	22.6	38,148	11.7
1970	7,000	35.9	44,872	17.6
1971	8,750	25.0	49,157	9.5
1972	9,888	13.0	48,470	-1.4
1973	11,372	15.1	51,000	5.2
1974	15,760	38.5	52,533	3.0
1975	19,500	23.7	52,561	0.1
1976	23,200	19.0	50,108	-4.7
1977	26,260	12.1	48,450	-3.3
1978	30,000	15.4	42,553	-12.2
1979	36,600	22.0	45,636	7.2
1980	45,750	25.0	45,750	0.2
1981	52,160	14.0	40,560	-11.3
1982	55,970	7.3	38,787	-4.4
1983	55,970	0	35,832	-7.6
1984	57,650	3.0	38,408	7.2

Source: Ministry of Agriculture and Fisheries, Food Bureau, various issues.

a/ Deflated by the index of prices paid by farmers (1980=100).

Appendix 28. Government Purchase Price versus Selling Price for Rice, 1960-84 (won/80kg bag)

Year	Purchase Price (A)	Selling Price (B)	Price Difference (C=B-A)	Handling Cost (D)	Loss or Gain	B/A (%)
1960	1,059	1,216	157	157	0	114.8
1961	1,550	1,792	242	242	0	115.6
1962	1,650	1,888	238	238	0	114.4
1963	1,060	2,312	252	251	0	112.2
1964	2,967	3,450	483	346	137	116.3
1965	3,150	3,350	200	394	-194	106.3
1966	3,306	3,900	594	446	148	118.0
1967	3,590	4,100	510	507	3	114.2
1968	4,200	5,200	1,000	496	504	123.8
1969	5,150	5,400	250	578	-328	106.2
1970	7,000	6,500	-500	664	-1,164	92.9
1971	8,750	9,500	750	738	12	108.6
1972	9,888	9,500	388	792	-1,180	96.1
1973	11,372	11,264	-108	915	-1,028	99.1
1974	15,760	13,000	-2,760	1,488	-4,248	82.5
1975	19,500	16,730	-2,770	1,996	-4,766	86.2
1976	23,200	19,500	-3,700	2,424	-6,124	84.1
1977	26,260	22,420	-3,840	3,372	-7,212	85.4
1978	30,000	26,500	3,500	5,088	8,588	88.3
1979	36,600	32,000	-4,600	7,126	-11,960	87.4
1980	45,750	44,000	-1,750	9,750	-11,500	96.2
1981	52,160	53,280	1,120	10,184	-9,064	102.1
1982	55,970	52,280	-3,690	9,358	-13,048	93.4
1983	55,970	52,280	-3,690	14,782	-16,312	93.4
1984	57,650	54,260	-3,390	16,262	-19,652	94.1

Source: Ministry of Agriculture and Fisheries, Food Bureau, various issues.

Appendix 29. Government Purchase versus Selling Prices for Barley, 1964-84 (won/76.5kg bag)

Year	Purchase Price (A)	Selling Price (B)	Price Difference (C=B-A)	Handling Costs (D)	Loss or Gain (C+D)	B/A (%)
1964	1,147	1,377	230	na	na	120.1
1965	2,295	2,463	168	na	na	107.3
1966	2,295	2,463	168	na	na	107.3
1967	2,490	2,632	142	a	a	105.7
1968	2,640	2,750	110	na	na	104.2
1969	3,348	2,750	-598	439	-1,037	82.1
1970	3,850	3,100	-750	548	-1,298	80.5
1971	4,890	4,300	-590	672	-1,262	87.9
1972	6,357	4,800	-1,557	na	na	75.5
1973	6,993	6,000	-933	909	-1,902	85.8
1974	6,091	8,320	-771	1,412	-3,603	91.5
1975	11,100	8,320	-2,780	1,446	-4,226	75.0
1976	13,000	9,200	-3,800	1,749	-5,549	70.8
1977	15,500	10,120	-5,380	2,462	-7,842	65.3
1978	18,500	10,120	-8,380	4,068	-12,448	54.7
1979	22,000	10,120	-11,880	9,618	-21,498	46.0
1980	26,400	17,595	-8,805	12,546	-21,350	66.0
1981	29,700	19,355	-10,345	13,691	-24,036	65.2
1982	33,780	28,000	-5,780	9,473	-15,253	82.9
1983	33,780	30,800	-2,980	10,009	-12,989	91.2
1984	39,181	31,420	-7,761	10,490	-18,251	80.2

Source: Ministry of Agriculture and Fisheries, Food Bureau, various issues.

Appendix 30. GMF Deficit by Kind of Grain, 1970-84

Unit: Billion won

Year	Rice	Barley	Other Cereals	Wheat Flour	Total
1970-76	57.3	108.4	(-)5.5[a/]	128.0[b/]	288.2
1977	21.9	43.3	2.1	-	63.1
1978	154.0	14.5	9.4	-	159.1
1979	185.1	28.5	4.9	-	208.7
1980	140.0	106.8	5.1	-	241.7
1981	21.8[c/]	126.8	4.5	-	144.1
1982	17.9[c/]	115.7	3.1	-	130.5
1983	259.9	85.1	8.0	-	337.0
1984	350.2	76.2	-	-	426.2
Total	1,208.2	705.3	31.6	128.0	2,073.1
Relative Share (%)	58.3	34.0	1.5	6.2	100.0

Source: Ministry of Agriculture and Fisheries, Food Bureau, various issues.

a/ Represents profit.
b/ Price subsidy due to high international price
c/ A large portion of loss incurred in sales of domestic rice was compensated for by profits generated by sales of imported rice.

Appendix 31. Long-term Overdraft due to Grain Operation and Its Share in Total Money Supply, 1970-84

Unit: Billion won

Year	Annual Balance in Overdraft	Money Supply (M_1)	Increase in Money Supply	A/B
	(A)		(B)	%
1970	0	308	56	-
1971	0	358	50	-
1972	36	519	161	22.4
1973	50	730	211	23.7
1974	160	946	216	74.1
1975	230	1,182	236	97.5
1976	130	1,544	362	35.9
1977	150	2,173	629	23.8
1978	154	2,714	541	28.5
1979	(-)68	3,275	561	-
1980	130	2,807	532	24.4
1981	220	3,982	175	-
1982	200	5,799	1,817	11.0
1983	250	6,783	984	25.4
1984	0[a/]	7,597	814	-
Total	1,710			

Source: Ministry of Agriculture and Fisheries, Food Bureau, Bank of Korea, Economic Statistics Yearbook, various issues.

a/ GMF deficit was compensated for from the general budget account.

Appendix 32a. Prevailing Relative Prices, 1960-84
(Producer Prices)

YEAR	BARLEY / RICE	SOYBEAN / RICE	BEEF / RICE	PORK / RICE	RICE / PNA	BARLEY / PNA	SOYBEAN / PNA	BEEF / PNA	PORK / PNA
					₩1000/MT	₩1000/MT	₩1000/MT	₩1000/MT	₩1000/MT
1960	0.646	0.915	4.939	3.415	212.9	137.6	194.7	1051.3	726.8
61	0.714	0.749	4.384	3.153	245.4	175.3	183.7	1075.8	773.6
62	0.750	0.755	4.398	4.213	249.6	187.2	188.4	1097.8	1051.5
63	0.823	0.791	2.965	2.529	361.6	297.5	286.0	1072.3	914.6
64	0.864	0.974	2.780	2,921	362.2	313.1	352.8	1006.9	1057.7
65	0.696	1.085	4.813	3.890	282.2	196.3	306.1	1358.3	1097.9
66	0.626	1.156	5.366	3.333	249.6	156.4	288.6	1339.6	832.1
67	0.657	1.395	6.245	4.099	245.3	161.1	342.2	1532.1	1005.6
68	0.610	0.829	6.849	5.027	260.0	158.6	215.5	1780.6	1307.0
69	0.573	0.730	5.920	3.358	293.6	168.2	214.5	1738.1	985.8
70	0.556	1.007	6.173	3.814	297.6	165.4	299.5	1836.9	1134.9
71	0.613	0.827	5.954	3.723	345.0	211.5	285.3	2054.3	1284.4
72	0.617	0.814	6.174	2.644	399.4	246.6	324.9	2465.7	1055.8
73	0.603	0.911	6.364	3.582	402.7	243.0	367.0	2562.6	1442.2
74	0.528	0.777	4.951	2.869	479.3	252.9	372.2	2373.2	1375.0
75	0.585	0.753	4.292	3.330	516.7	302.2	389.3	2217.7	1723.7
76	0.503	0.864	5.877	3.761	540.1	271.8	466.6	3174.3	2031.4
77	0.667	1.112	7.634	3.742	508.4	339.3	565.6	3880.6	1902.6
78	0.645	1.007	9.117	4.956	532.5	343.2	536.1	4854.3	2639.1
79	0.578	0.594	6.965	3.063	558.9	323.0	331.8	3893.0	1711.7
80	0.565	0.939	6.427	3.160	562.6	317.7	528.2	3616.0	1778.0
81	0.561	1.168	8.162	4.705	561.4	314.9	655.4	4581.9	2641.4
82	0.612	1.066	9.554	4.505	525.9	322.0	560.7	5024.6	2369.3
83	0.626	1.175	10.460	4.004	505.0	316.3	593.1	5282.0	2021.9
84	0.630	1.133	9.595	3.117	504.1	317.4	570.9	4836.9	1571.3

Source: Computed from Appendix 13 and 16a.

Appendix 32b. Prevailing Relative Prices, 1960~84
(Consumer Prices)

YEAR	BARLEY / RICE	SOYBEAN / RICE	BEEF / RICE	PORK / RICE	RICE / PNA	BARLEY / PNA	SOYBEAN / PNA	BEEF / PNA	PORK / PNA
					W1000/MT	W1000/MT	W1000/MT	W1000/MT	W1000/MT
1960	0.663	0.900	6.737	3.684	246.6	163.5	221.9	1661.3	908.5
61	0.742	0.742	6.638	3.493	276.8	205.5	205.5	1837.4	967.0
62	0.767	0.750	6.907	4.110	272.7	209.2	204.5	1883.5	1120.9
63	0.769	0.763	4.574	2.793	395.3	303.8	301.7	1808.2	1103.9
64	0.850	0.922	4.348	3.109	385.2	330.8	358.8	1692.3	1210.0
65	0.734	1.030	6.078	4.427	306.8	225.2	316.0	1865.0	1358.3
66	0.704	1.154	6.615	4.566	265.0	186.5	305.7	1752.7	1209.8
67	0.732	1.430	7.099	4.929	259.6	190.1	371.2	1842.7	1279.4
68	0.609	0.842	10.000	6.021	269.0	161.5	226.4	2689.8	1619.6
69	0.560	0.860	10.090	5.360	288.0	161.3	247.7	2905.5	1543.5
70	0.601	1.080	10.000	4.819	301.1	181.0	325.3	3010.8	1450.8
71	0.641	0.963	10.053	5.529	336.4	215.5	323.8	3381.9	1860.1
72	0.547	0.884	8.331	3.986	430.2	235.4	380.4	3583.8	1714.9
73	0.568	0.956	8.668	4.618	416.9	236.7	398.6	3613.5	1925.1
74	0.455	0.908	7.686	4.084	453.8	206.4	412.2	3488.3	1853.3
75	0.476	0.857	6.980	4.764	506.9	241.3	434.5	3538.1	2414.9
76	0.469	1.016	8.182	5.109	536.2	251.5	544.6	4387.7	2739.9
77	0.574	1.195	9.712	4.856	531.4	305.0	635.0	5161.0	2580.5
78	0.576	1.207	9.742	5.886	514.4	296.5	621.1	5011.1	3027.8
79	0.434	1.088	8.737	4.560	525.9	228.3	572.0	4594.9	2397.9
80	0.325	0.967	7.501	3.587	622.6	202.6	602.1	4670.0	2233.0
81	0.425	1.135	8.337	4.706	674.5	286.5	765.8	5623.1	3174.0
82	0.364	1.061	9.000	4.414	636.7	232.1	675.3	5730.0	2810.3
83	0.481	1.232	10.414	4.167	587.2	282.4	723.6	6115.8	2446.9
84	0.521	1.260	9.794	3.182	577.3	300.9	727.5	5654.0	1836.7

Source: Computed from Appendix 13 and 16b.

Appendix.33a. Border Prices of Major Agricultural Products[a/]
(Producer Price Equivalent)

Year	Rice[b/] $/MT	Barley[b/] $/MT	Soybean $/MT	Beef $/MT	Pork $/MT
1960	145.2	84.3	92.6	700.0	540.0
61	130.8	52.1	109.1	750.0	520.0
62	149.6	106.6	108.7	700.0	490.0
63	149.6	99.3	108.2	710.0	440.0
64	176.7	111.3	129.1	720.0	540.0
65	170.5	81.2	122.2	740.0	470.0
66	171.4	136.9	125.4	860.0	480.0
67	192.6	144.3	125.3	900.0	500.0
68	188.6	114.0	127.6	930.0	500.0
69	205.2	104.9	108.5	1,030.0	570.0
70	203.1	130.0	116.8	1,100.0	530.0
71	160.3	102.1	144.8	1,170.0	530.0
72	147.5	99.9	137.5	1,260.0	560.0
73	269.5	164.9	227.9	1,700.0	690.0
74	458.0	256.3	285.6	1,810.0	1,150.0
75	434.0	296.7	260.9	1,570.0	1,100.0
76	282.3	222.2	260.9	1,810.0	1,370.0
77	235.5	182.4	323.1	2,040.0	1,540.0
78	352.5	186.1	271.9	2,100.0	2,750.0
79	309.0	199.4	316.5	2,790.0	2,680.0
80	392.6	261.6	308.7	3,400.0	2,480.0
81	451.5	294.0	338.4	3,600.0	4,140.0
82	458.2	227.0	268.9	3,300.0	4,560.0
83	494.4	210.7	279.1	3,600.0	3,070.0
84	529.0	291.3	294.0	3,100.0	2,600.0

Source: The Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.
Union of Livestock Cooperatives, Demand & Supply of Livestock Products, various issues.
FAO, Trade Yearbook, various issues.

a/ CIF prices

b/ Converted from milled(brown)to polished basis, using conversion ratio of 0.93 for rice and 0.67 for barley

Appendix 33b. Border Prices of Major Agricultural Products [a/]
(Consumer Price Equivalent)

Year	Rice ₩1000/MT	Barley ₩1000/MT	Soybean ₩1000/MT	Beef ₩1000/MT	Pork ₩1000/MT
1960	12.5	9.2	9.5	64.2	45.8
61	19.5	11.4	17.0	117.6	78.4
62	22.9	18.3	17.3	116.6	80.0
63	25.2	19.9	18.6	119.3	74.8
64	43.3	34.4	33.1	184.8	139.0
65	49.2	31.1	38.7	238.4	157.4
66	52.0	46.9	42.5	279.7	164.5
67	60.4	50.9	48.3	298.9	176.3
68	62.4	40.2	47.2	346.8	196.0
69	68.4	40.7	45.1	402.1	224.1
70	74.9	52.1	50.5	463.3	227.3
71	73.6	46.3	67.6	554.7	271.3
72	77.2	55.3	79.9	666.8	307.9
73	129.4	77.9	116.3	856.4	377.1
74	203.4	124.0	155.8	934.7	579.8
75	252.4	172.3	172.4	1010.6	715.5
76	186.9	150.1	200.4	1228.0	898.2
77	165.6	168.3	239.0	1438.0	986.4
78	239.3	189.2	242.8	1508.3	1649.0
79	251.2	200.4	312.0	1903.3	1605.9
80	415.1	348.0	364.3	2797.0	1880.5
81	553.2	479.2	467.6	3484.3	3443.1
82	591.5	370.5	463.5	3579.1	3945.7
83	601.1	319/9	448.1	4099.5	2941.4
84	708.2	398.0	558.1	3739.2	2526.9

Source: The Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.
Union of Livestock Cooperatives, Demand & Supply of Livestock Products, various issues.
FAO, Trade Yearbook, various issues.
And also see Appendix 35.

a/ (Border price X Nominal exchange rate) + Handling and marketing costs

Appendix 34a. Effect of Direct Intervention on Relative Producer Prices, 1960-84
(Evaluated at the Effective Nominal Exchange Rates, E_e) a/

Year	Relative Border Prices(1000 won/MT)					Direct Nominal Protection Rates(NPR_D) b/				
	Rice/NA	Barley/NA	Soybean/NA	Beef/NA	Pork/NA	Rice/NA	Barley/NA	Soybean/NA	Beef/NA	Pork/NA
1960	272.1	162.7	178.8	1352.0	1043.1	-.218	-.155	.088	-.222	-.303
61	226.4	92.9	194.7	1338.4	927.9	.084	.885	-.056	-.196	-.166
62	254.0	186.5	190.2	1225.0	857.6	-.017	.003	-.010	-.104	.277
63	288.9	197.7	215.5	1413.7	876.1	.252	.504	.327	-.242	.044
64	405.6	263.4	305.5	1703.9	1277.8	-.107	.189	.155	-.409	-.172
65	355.4	172.2	262.1	1590.3	1010.0	-.206	.125	.166	-.146	.086
66	317.0	260.9	239.0	1639.4	915.0	-.212	-.401	.207	-.183	-.091
67	337.7	253.1	219.7	1578.2	876.8	-.273	-.363	.557	-.029	.147
68	317.2	191.7	214.6	1563.9	840.9	-.180	-.172	.004	.139	.555
69	326.5	166.9	172.7	1639.2	907.1	-.101	.008	.242	.060	.087
70	316.0	202.3	181.8	1711.8	824.7	-.058	-.182	.648	.073	.376
71	260.1	165.6	235.0	1898.5	860.0	.326	.277	.215	.082	.494
72	241.0	163.2	224.7	2058.7	915.0	.657	.510	.446	.198	.154
73	418.4	256.0	353.9	2639.2	1071.2	-.037	-.051	.037	-.029	.346
74	576.7	322.7	359.5	2279.0	1448.0	-.168	-.216	.036	.041	-.050
75	543.1	371.3	326.5	1964.6	1376.5	-.049	-.186	.192	.129	.252
76	538.5	368.2	323.7	1947.8	1364.7	.746	.117	.632	.601	.353
77	234.6	181.0	320.6	2024.1	1528.1	1.175	.875	.764	.918	.245
78	286.3	151.2	229.2	1705.4	2233.2	.860	1.272	1.428	1.847	.182
79	208.2	134.3	308.1	1879.7	1805.7	1.684	1.405	.557	1.071	-.052
80	235.1	168.6	199.0	3041.4	1683.7	1.223	.884	1.654	.650	.112
81	273.8	178.4	206.1	3017.3	2519.7	1.050	.766	2.193	1.098	.052
82	268.8	133.1	157.8	1936.2	2684.5	.956	1.418	2.525	1.596	.036
83	290.6	123.8	164.0	2115.6	1804.1	.738	1.554	2.617	1.497	.120
84	312.7	169.1	173.8	1832.5	1536.9	.612	.843	2.285	1.640	.022

Source: Computed from Appendix 13, 14, 32a and 33a.

a/ E_e = Effective nominal exchange rate = $E_o \times (1+t_s)$

where E_o = Official nominal exchange rate

t_s = Export subsidy rate

b/ $NPR_D = \frac{\text{Domestic producer price/Pna}}{\text{Border price/Pna}} - 1 = \frac{\text{Domestic producer price}}{\text{Border price}} - 1$

Appendix 34b. Effect of Direct Intervention on Relative Consumer Prices, 1960-84
(Evaluated at the Effective Nominal Exchange Rates, E_e) [a/]

Year	Relative Border Prices(1000 won/MT)					Direct Nominal Protection Rates(NPR_D^C) [b/]				
	Rice/NA	Barley/NA	Soybean/NA	Beef/NA	Pork/NA	Rice/NA	Barley/NA	Soybean/NA	Beef/NA	Pork/NA
1960	318.8	213.4	226.8	1612.8	1195.7	-.227	-.234	-.022	.030	-.240
61	269.9	152.2	235.8	1626.8	1090.4	.025	.351	-.128	.129	-.108
62	300.2	237.4	227.2	1520.8	1045.9	-.092	-.119	-.100	.238	.072
63	355.2	271.3	262.8	1679.6	1061.6	.113	.120	.149	.065	.040
64	463.2	353.9	352.9	1969.6	1481.1	-.160	-.066	.017	-.142	-.183
65	392.0	241.1	306.2	1883.1	1238.2	-.217	-.065	-.032	-.010	.097
66	357.7	318.8	289.2	1914.6	1118.3	-.260	-.415	.056	-.084	.082
67	380.9	314.2	295.0	1867.5	1091.7	-.319	-.397	.258	-.013	.172
68	365.5	232.5	270.9	1986.2	1113.3	-.264	-.305	-.164	.355	.455
69	366.7	212.3	232.8	2095.3	1166.4	-.215	-.240	.065	.387	.323
70	361.7	247.9	237.1	2184.5	1068.5	-.168	-.270	.371	.378	.358
71	324.1	204.5	296.9	2429.4	1172.5	.038	.054	.091	.392	.587
72	303.9	215.7	309.6	2621.4	1203.1	.415	.092	.229	.367	.424
73	488.1	294.8	434.6	3206.5	1394.6	-.146	-.198	-.083	.127	.381
74	629.2	378.6	467.7	2826.7	1759.4	-.279	-.455	-.119	.235	.054
75	636.8	434.8	428.6	2520.1	1782.2	-.204	-.445	.014	.403	.355
76	407.8	326.8	430.9	2672.5	1961.7	.315	-.230	.264	.642	.397
77	326.5	324.8	469.1	2834.4	1961.6	.629	-.061	.353	.820	.316
78	396.2	309.7	398.6	2492.1	2741.8	.299	-.042	.557	1.011	.104
79	340.8	269.9	420.4	2601.1	2208.5	.543	-.154	.360	.765	.086
80	429.9	357.8	375.9	2925.0	1973.8	.448	-.434	.602	.597	.130
81	483.9	416.8	408.0	3066.5	3044.5	.394	-.313	.877	.833	.043
82	466.7	290.9	363.5	2835.8	3147.5	.365	-.202	.858	1.019	-.107
83	450.4	238.8	334.3	3075.8	2215.2	.304	.183	1.166	.989	.104
84	514.3	289.0	403.5	2720.2	1845.5	.122	.041	.802	1.078	-.005

Source: Computed from Appendix 13, 14, 32b and 33b.

a/ E_e = Effective nominal exchange rate = $E_o \times (1+t_s)$

where E_o = Official nominal exchange rate

t_s = Export subsidy rate

b/ $NPR_D^C = \frac{\text{Domestic consumer price/Pna}}{\text{Consumer equiv. border price/Pna}} - 1 = \frac{\text{Domestic consumer price}}{\text{Consumer equiv. border price}} - 1$

Appendix 35. Marketing Margins and Handling Costs of Major Agricultural Products

Unit: W1,000/MT

Year	Rice		Barley		Soybean		Beef	Pork
	Market Margins	Handling Costs	Market Margins	Handling Costs	Market Margins	Handling Costs		
1960	1.9	1.7	2.0	1.9[B]	2.7	1.0[C]	20.1	11.8
61	1.9	1.7	2.3	2.6[B]	2.4	1.0[C]	23.9	13.4
62	1.5	2.5	1.5	2.3[B]	2.1	1.1[C]	25.6	16.3
63	2.6	3.7	2.4	4.6[B]	2.8	1.7[C]	27.0	17.7
64	2.6	4.2	4.6	6.1[B]	2.9	2.7[C]	31.4	24.0
65	2.3	2.9	4.7	4.8[B]	3.4	2.8[C]	41.6	32.4
66	2.4	4.5	5.4	4.4	4.7	3.8	46.6	34.4
67	2.6	5.6	6.0	5.8	9.0	5.3	55.0	40.8
68	3.9	6.3	2.7	5.9	7.1	4.8	89.2	57.5
69	3.1	6.3	4.0	6.5	9.4	4.5	105.5	60.0
70	4.5	7.2	6.1	5.7	9.8	4.4	121.2	62.5
71	9.5[A]	8.3	3.6	7.2	12.4	4.8	147.6	86.9
72	10.0	9.2	7.2	8.8	20.7	5.2	171.6	87.9
73	12.2	9.9	1.9	10.4	19.7	5.9	179.8	102.5
74	8.8	11.4	9.6	11.9	34.1	7.5	210.7	119.8
75	23.7	18.6	10.2	18.5	35.0	11.1	250.7	183.1
76	25.3	25.0	23.7	18.9	58.6	15.5	352.0	235.2
77	21.3	30.3	57.1	22.9	68.1	22.5	450.6	241.1
78	26.5	42.2	66.9	32.2	90.7	28.5	491.9	318.0
79	38.0	63.6	50.7	53.2	137.9	28.9	553.0	388.8
80	87.7	89.1	63.5	125.7	145.3	31.6	733.2	375.1
81	123.8	121.9	65.0	164.0	188.4	48.7	1,032.7	623.8
82	129.3	127.3	25.6	179.0	221.6	45.3	1,166.8	612.4
83	100.4	117.0	32.6	123.8	176.0	55.5	1,305.9	559.1
84	97.0	184.8	32.4	130.8	269.3	51.8	1,240.6	431.3

Source: The Bank of Korea, Price Survey, various issues
Economic Planning Board, Annual Report on The Price Survey, various issues
Ministry of Agriculture and Fisheries, Foodgrain Administration Summary, 1977
———————————, Major Indicators of Agricultural Policies, 1985

a) Marketing margin = Consumer price - Wholesale price

A: Marketing margin adjusted according to the following formular:
Consumer price - (Wholesale price + Administrative price) / 2

b) Figures represent transportation costs, storing costs and other operational costs.

B: Values estimated based on the ratio (16.68%) of margins for the period, 1966-1978

C: Values estimated based on the ratio (6.35%) of margins for the period, 1966-1975

Appendix 36. Estimation of Supply Elasticities and Cross-elasticities Using Simultaneous Translog Profit Functions

Items	Prices of Output						Prices of Input			Fixed Input
	Rice	Barley	Pulses	Fruits	Livestock	Other	Labor	Machinery	Materials	Land Average
Rice	.506	-.094	-.020	.028	.328	.268	-.416	-.052	-.547	.999
Barley	-.576	.731	.181	.366	.308	.005	-.727	.007	-.296	.447
Pulses	-.432	.620	1.198	.566	1.010	.449	-.102	-.139	-.775	.843
Fruits	.365	.773	.349	.456	-.844	-.083	-.334	-.271	-.411	.931
Live-stock	1.567	.239	.229	-.310	-.085	-.624	-.775	.067	-.307	.574
Others	.838	.002	.067	-.020	-.409	.537	-.326	-.048	-.642	.668

Source: The Ministry of Agriculture and Fisheries, The Farm Household Economy Survey, 1964-84.
The National Agricultural Cooperatives Federation, The Rural Price Survey, 1964-84.

Appendix 37. Supply Elasticities Estimated by Other Researchers

Item	Period	Elasticities		Authors [a]	Remarks
		Short-Run	Long-Run		
Rice	1956-67	.29	-	NACF(1968)	
	1957-69	.33	-	NACF(1971)	
	1955-70	.09-.21	.15	Ferris & Suh(1972)	
	1960-71	.23	.51	Seol(1972)	
	1961-71	.33	.53	Moon(1973)	
	1965-80	.57	-	Huh(1982)	
	1970&79	.37-.52	-	Braverman(1983)	Cross-section
	?	.42	-	"	Time series
	1964-83	.51	-	Hyun(1985)	
Barley	1955-70	-	.85	Ferris & Suh(1972)	
	1961-71	.42	.52	Moon(1973)	
	1965-80	1.82	-	Huh(1982)	
	1964-83	.51	-	Hyun(1985)	All grain except rice
Soybean	1955-70	-	.88	Ferris & Suh(1972)	Pulses
	1965-80	.17	.21	Huh(1982)	
	1964-83	.51	-	Hyun(1985)	All grain except rice
Beef	1955-70	-	1.24	Ferris & Suh(1972)	
	1959-78	.44	1.39	Huh(1980)	
	1963-83	.46	2.49	Huh(1984)	
	1965-83	.31	1.11	"	
	1969-83	.51	2.60	"	
	1970-83	.30	.46	"	
	1964-83	-.39	-	Hyun(1985)	Livestock total
Pork	1955-70	-	.74	Ferris & Suh(1972)	
	1959-78	.61	-	Huh(1980)	
	1965-83	.61-1.39	1.33-3.49	Huh(1984)	
	1969-83	1.14-1.25	4.15-7.46	"	
	1970-83	1.05	3.22	"	
	1964-83	-.39	-	Hyun(1985)	Livestock total

[a] Braverman, A., C. Y. Ahn, and J. S. Hammer(1983), Alternative Agricultural Pricing Policies in the Republic of Korea; Their Implications for Government Deficits, Income Distribution, and Balance of Payments, World Bank Staff Working Paper No. 621

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Appendix 38. Demand Elasticities Estimated by Other Researchers

Item	Period	Elasticities		Authors [a]	Remarks
		Price	Income		
Rice	1960-71	-1.24	.22	Seol(1973)	
	1959-74	-.38	.10	Sung(1975)	
	1962-76	-.18	.15	Lee(1978)	
	1962-78	-.72	.50	Choo(1980)	
	1965-80	-.23	.22	Huh(1982)	
	1964-81	-.56	.33	Lee(1984)	Traditional Rice
	"	-.63	.02	"	High Yield Rice
	1970-84	-.20	-.17	Choo(1985)	
	?	-.45	.62	Braverman,	HY Rice(Urban)
	?	-.46	.78	Hammer & Ahn	" (Rural)
	?	-.53	1.00	(1985)	T. Rice(Urban)
	?	-.50	1.00		" (Rural)
Barley	1960-71	-.88	.17	Seol(1973)	
	1959-74	-.32	-.47	Sung(1975)	
	1962-76	-.30	-.06	Lee(1978)	
	1962-78	-.79	-.49	Choo(1980)	
	1965-80	-.09	-1.88	Huh(1982)	
	1964-81	-.50	-.20	Lee(1984)	
	1970-84	-.15	-2.01	Choo(1985)	
	?	-.15	-.20	Braverman,	Urban
	?	-.51	.33	Hammer & Ahn (1985)	Rural
Soybean	1959-74	-.21	1.37	Sung(1975)	
	1962-76	-.24	.39	Lee(1978)	
	1962-78	-.13	.39	Choo(1980)	
	1965-80	-.50	.74	Huh(1982)	
	1964-81	-.40	.90	Lee(1984)	
	1970-84	-.23	.20	Choo(1985)	
Beef	1959-74	-.81	.81	Sung(1975)	
	1962-76	-.84	1.17	Lee(1978)	
	1961-80	-.36	.61	Kim(1981)	
	1965-80	-.51	1.30	Huh(1982)	
	1969-80	-1.34	1.38	Cho(1982)	
	1965-81	-.81	1.48	Choo(1983)	
	1964-81	-1.27	1.39	Lee(1984)	
	1965-83	-.17	1.70	Huh(1984)	
	1965-83	-.59	1.32	Choo(1985)	
Pork	1959-74	-.07	1.96	Sung(1975)	
	1962-76	-.31	.65	Lee(1978)	
	1961-80	-.58	.48	Kim(1981)	
	1965-80	-1.07	1.27	Huh(1982)	
	1968-81	-.88	1.03	Lee(1982)	
	1969-80	-1.53	1.19	Cho(1982)	
	1965-81	-.89	.96	Choo(1983)	
	1964-81	-1.37	1.08	Lee(1984)	
	1968-83	-.53	1.05	Huh(1984)	
	1965-83	-.91	.71	Choo(1985)	

Footnotes to Appendix 38.

a/ Braverman, A., J. S. Hammer and C. Y. Ahn(1985), "Multi-Market Analysis of Agricultural Prices in Korea", in Newbery, D. and N. Stern(eds): The Theory of Taxation for Developing Countries, Final Revision Version

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Appendix 39a. Short-Run Effect of Direct and Indirect Price Interventions on Relative Producer Prices, 1960-84

Year	Rice	Barley	Soybean	Beef	Pork
	Δp_R^{SR}	Δp_B^{SR}	Δp_S^{SR}	Δp_{BF}^{SR}	Δp_{PK}^{SR}
1960	-.339	-.284	-.080	-.343	-.411
61	-.379	.082	-.459	-.540	-.523
62	-.498	-.487	-.494	-.542	-.372
63	-.298	-.158	-.257	-.575	-.415
64	-.397	-.197	-.219	-.601	-.441
65	-.442	-.207	-.179	-.399	-.235
66	-.437	-.572	-.138	-.416	-.350
67	-.460	-.526	-.159	-.278	-.147
68	-.399	-.393	-.264	-.165	.140
69	-.323	-.242	-.066	-.204	-.182
70	-.259	-.357	.297	-.155	.083
71	.034	-.004	-.053	-.156	.166
72	.528	.395	.334	.105	.065
73	-.059	-.071	.015	-.050	.317
74	-.304	-.344	-.134	-.129	-.206
75	-.208	-.322	-.007	-.060	.043
76	.725	.095	.600	.608	.327
77	1.198	.895	.783	.938	.258
78	.954	1.073	1.217	1.599	.079
79	1.239	1.006	.298	.728	-.209
80	.828	.549	1.183	.357	-.086
81	.789	.541	1.787	.831	-.082
82	.783	1.204	2.239	1.365	-.193
83	.634	1.402	2.401	1.348	.054
84	,536	,756	2.130	1.515	-.026

Source: Computed from Table 7a and Appendix 10, 11, 12 and 29.

a/ $\Delta p_i^{SR} = NPR_{it} = \dfrac{P_i - E^*/E_o \cdot P_i'}{E^*/E_o \cdot P_i'}$

where. P_i = Domestic producer price of agricultural products.
E^* = Free trade equilibrium exchange rate.
E_o = Nominal exchange rate.
P_i' = Border price of agricultural products (in won).

Appendix 39b. Effect of Price Interventions on Relative Input Prices, 1960-84

Year	NPR_D		NPR^{SR}		NPR_T	
	Fertilizer/NA	Feed/NA	Fertilizer/NA	Feed/NA	Fertilizer/NA	Feed/NA
1960	.333	.387	-.522	-.503	-.535	-.516
61	-.033	.279	-.529	-.379	-.382	-.185
62	.923	.319	-.157	-.422	.183	-.189
63	1.098	.356	-.193	-.479	.164	-.248
64	-.160	.248	-.567	-.357	-.446	-.177
65	.251	.188	-.232	-.271	-.086	-.133
66	.258	.279	-.246	-.234	-.145	-.131
67	-.137	.222	-.477	-.259	-.417	-.173
68	-.089	.254	-.479	-.284	-.405	-.182
6-	.000	.253	-.412	-.263	-.335	-.167
70	.179	.252	-.277	-.232	-.195	-.145
71	.070	.272	-.355	-.234	-.283	-.149
72	-.108	.185	-.349	-.135	-.338	-.121
73	-.284	.134	-.432	-.100	-.444	-.120
74	-.019	.205	-.323	-.169	-.290	-.128
75	.351	.218	-.034	-.130	.015	-.086
76	.934	.118	.639	-.053	.607	-.071
77	.570	.079	.390	-.045	.340	-.080
78	.352	.086	.176	-.056	.176	-.056
79	.054	.153	-.177	-.099	-.145	-.064
80	-.152	.161	-.342	-.100	-.314	-.061
81	.152	.127	-.032	-.053	-.018	-.039
82	.538	.093	.349	-.041	.369	-.027
83	.608	.065	.461	-.032	.465	-.029
84	.396	.056	.293	-.023	.286	-.027

Source: National Agricultural Cooperatives Federation, Rural Price and Wage Survey, various issues.
FAO, Trade Yearbook, various issues.

Appendix 39c. Three-Year Moving Averages of Nominal Protection Rate (Producer Price)

Year	NPR_D					NPR^{SR}					NPR_T				
	Rice/ NA	Barley/ NA	Soybean/ NA	Beef/ NA	Pork/ NA	Rice/ NA	Barley/ NA	Soybean/ NA	Beef/ NA	Pork/ NA	Rice/ NA	Barley/ NA	Soybean/ NA	Beef/ NA	Pork/ NA
1962	.424	.797	.613	.277	.353	-.405	-.230	-.344	-.475	-.435	-.277	-.051	-.226	-.369	-.304
63	.416	.862	.401	.033	.312	-.392	-.188	-.403	-.552	-.437	-.154	.121	-.167	-.379	-.215
64	.380	.641	.534	-.025	.346	-.398	-.281	-.323	-.573	-.409	-.170	-.013	-.072	-.411	-.186
65	.303	.682	.596	-.046	.285	-.379	-.187	-.218	-.525	-.364	-.185	.060	.015	-.388	-.178
66	.008	.189	.431	-.090	.139	-.425	-.325	-.179	-.472	-.342	-.308	-.181	-.015	-.370	-.212
67	-.014	-.070	.564	.049	.247	-.446	-.435	-.159	-.364	-.244	-.364	-.347	.084	-.271	-.133
68	.032	-.147	.547	.209	.496	-.432	-.497	-.187	-.286	-.119	-.357	-.430	.038	-.192	-.002
69	.102	.044	.596	.336	.597	-.394	-.387	-.163	-.216	-.063	-.316	-.308	.062	-.113	.059
70	.136	.133	.663	.397	.716	-.327	-.331	-.011	-.175	.014	-.242	-.246	.112	-.069	.143
71	.359	.331	.758	.378	.697	-.183	-.201	.059	-.172	.022	-.087	-.107	.183	-.074	.141
72	.676	.540	.841	.433	.721	.101	.011	.193	-.069	.105	.175	.080	.284	.000	.194
73	.670	.523	.563	.374	.688	.168	.107	.099	-.034	.183	.208	.145	.134	-.003	.222
74	.433	.346	.457	.327	.426	.055	-.007	.072	-.025	.059	.068	.005	.086	-.011	.068
75	.102	.024	.309	.259	.425	-.190	-.246	-.042	-.080	.051	-.172	-.230	-.018	-.056	.073
76	.379	.064	.511	.477	.392	.071	-.190	.153	.140	.055	.080	-.176	.174	.147	.077
77	.870	.460	.763	.785	.482	.572	.223	.459	.495	.209	.543	.203	.444	.464	.203
78	1.150	.937	1.149	1.341	.408	.959	.688	.867	1.048	.221	.832	.657	.835	1.001	.198
79	1.432	1.362	1.073	1.461	.223	1.130	.991	.766	1.088	.043	1.049	.995	.762	1.087	.038
80	1.392	1.317	1.342	1.316	.144	1.007	.876	.899	.895	-.072	.978	.925	.947	.937	-.048
81	1.454	1.136	1.602	1.049	.096	.952	.699	1.089	.639	-.126	1.017	.755	1.151	.690	-.097
82	1.178	1.119	2.272	1.213	.118	.800	.765	1.736	.851	-.120	.843	.805	1.797	.891	-.098
83	.987	1.329	2.574	1.487	.109	.735	1.049	2.142	1.181	-.074	.754	1.069	2.174	1.204	-.064
84	.826	1.346	2.587	1.660	.093	.651	1.121	2.257	1.409	-.055	.659	1.130	2.270	1.419	-.051

Source: Table 8-2, 10-2 and Appendix 39a.

Appendix 39d. Three-Year Moving Averages of Nominal Protection Rates (Consumer Price, Input Price)

Year	(Consumer Price) NPR_D^C					NPR_T^C					(Input Price) NPR_D		NPR^{SR}		NPR_T	
	Rice/ NA	Barley/ NA	Soybean/ NA	Beef/ NA	Pork/ NA	Rice/ NA	Barley/ NA	Soybean/ NA	Beef/ NA	Pork/ NA	Fert./ NA	Feed/ NA	Fert./ NA	Feed/ NA	Fert./ NA	Feed/ NA
1961	.244	.263	.271	.561	.256	-.270	-.137	-.251	-.074	-.267	.408	.328	-.403	-.435	-.245	-.297
62	.234	.311	.188	.377	.214	-.161	-.014	-.193	-.055	-.176	.662	.318	-.293	-.427	-.012	-.207
63	.196	.193	.283	.307	.214	-.188	-.129	-.124	-.103	-.168	.620	.308	-.306	-.419	-.033	-.205
64	.147	.205	.329	.212	.219	-.200	-.082	-.058	-.142	-.127	.390	.264	-.331	-.369	-.123	-.186
65	-.063	-.054	.220	.085	.167	-.318	-.256	-.092	-.193	-.121	.116	.238	-.348	-.287	-.226	-.147
66	-.145	-.196	.280	.115	.283	-.374	-.373	-.025	-.167	-.025	.124	.230	-.318	-.255	-.216	-.146
67	-.137	-.256	.231	.290	.456	-.385	-.453	-.079	-.056	.085	.011	.252	-.401	-.259	-.322	-.162
68	-.100	-.175	.247	.493	.572	-.365	-.394	-.059	.100	.172	-.075	.243	-.456	-.264	-.386	-.174
69	-.028	-.115	.311	.658	.658	-.309	-.348	-.011	.237	.247	.030	.253	-.389	-.260	-.312	-.165
70	.092	.033	.417	.677	.712	-.209	-.234	.073	.259	.300	.083	.259	-.348	-.243	-.271	-.154
71	.334	.161	.478	.666	.747	.012	-.113	.144	.279	.357	.047	.236	-.327	-.200	-.272	-.138
72	.331	.185	.290	.557	.741	-.160	-.077	.017	.218	.384	-.107	.197	.197	-.379	-.355	-.130
73	.193	-.033	.185	.471	.515	-.260	-.231	-.046	.169	.214	-.137	.175	-.368	-.135	-.357	-.123
74	-.071	-.255	.080	.451	.457	-.471	-.413	-.130	.159	.171	.016	.186	-.263	-.133	-.240	-.111
75	.077	-.291	.181	.614	.437	-.124	-.423	-.016	.327	.178	.422	.180	.094	-.117	.111	-.095
76	.386	-.168	.335	.800	.512	.188	-.283	.154	.543	.286	.618	.138	.332	-.076	.321	-.079
77	.532	-.052	.489	.966	.387	.355	-.144	.339	.747	.217	.619	.094	.402	-.051	.374	-.069
78	.578	-.046	.494	.974	.249	.409	-.125	.359	.754	.091	.325	.106	.130	-.067	.124	-.067
79	.483	-.188	.552	.866	.160	.329	-.249	.421	.642	.000	-.085	.133	-.114	-.085	-.094	-.060
80	.510	-.282	.658	.803	.137	.359	-.335	.520	.575	-.027	.018	.147	-.184	-.084	-.159	-.055
81	.441	-.302	.820	.878	.063	.319	-.344	.694	.681	.072	.179	.127	-.008	-.065	.012	-.042
82	.384	.029	1.001	.998	.044	.291	-.140	.896	.839	-.055	.433	.095	.259	-.042	.272	-.032
83	.288	.023	.969	1.073	.024	.217	-.024	.890	.945	-.053	.514	.071	.368	-.032	.373	-.028
84	.234	.129	1.059	1.071	.074	.170	.077	.931	.956	.002	—	—	—	—	—	—

Source: Table 8'-2, 10'-2 and Appendix 39b.

Appendix 40a. Direct Short-Run Effect on Foreign Exchange Earnings by Commodity[a/]

Unit: million US dollars

Year	Rice			Barley			Soybean			Beef			Pork		
	Output	Input	Total	Output	Input	Total	Output	Input	Total	Output	Input	Total	Output	Input	Total
1960															
61															
62	59.2	-.5	58.7	28.5	-.7	27.8	3.2	-.0	3.2	2.8	.0	2.8	4.4	-2.6	1.8
63	73.6	-.6	73.0	15.5	-.4	15.1	2.4	-.0	2.4	2.1	.0	2.1	3.5	-2.0	1.5
64	74.4	-1.0	73.4	25.8	-1.0	24.8	3.9	-.0	3.8	1.4	.0	1.4	5.9	-1.9	4.0
65	38.2	-.6	37.6	27.7	-1.0	26.7	3.9	-.0	3.9	-.7	.0	-.7	4.2	-1.9	2.3
66	-6.4	-.0	-6.4	17.7	-.4	17.3	3.8	-.0	3.7	-2.6	.0	-2.6	4.8	-1.5	3.3
67	-2.7	.0	-2.7	-15.2	.3	-14.8	4.9	-.1	4.8	-.9	.0	-.9	7.0	-2.6	4.4
68	3.8	-.1	3.7	-16.4	.5	-15.9	6.4	-.1	6.3	4.7	-.1	4.6	10.0	-4.5	5.5
69	32.6	-.3	32.4	1.3	-.2	1.1	6.3	-.1	6.2	8.2	-.1	8.1	15.4	-5.5	9.9
70	52.2	-.3	51.9	5.9	-.3	5.6	8.2	-.1	8.1	9.9	-.3	9.6	18.0	-8.4	9.6
71	128.9	-.7	128.2	4.6	-.6	4.0	11.4	-.1	11.4	10.5	-.4	10.1	18.6	-9.1	9.5
72	147.1	-1.2	145.8	17.9	-1.0	16.9	9.1	-.1	9.0	7.6	-.4	7.2	22.4	-7.9	14.5
73	267.9	-1.8	266.1	24.7	-1.2	23.5	12.1	-.1	12.0	13.6	-.6	13.0	23.5	-13.0	10.4
74	258.8	-1.1	257.6	36.1	-.8	35.3	13.7	-.1	13.6	18.1	-.9	17.2	28.8	-13.2	15.6
75	245.6	-.4	245.2	-54.9	-.1	-55.0	11.5	-.1	11.4	34.5	-.9	33.6	26.4	-14.9	11.5
76	395.5	-1.5	394.0	-81.1	.2	-80.9	18.3	-.1	18.2	63.4	-1.6	61.8	32.9	-13.7	19.2
77	557.0	-4.1	552.8	-37.2	-.6	-37.8	35.5	-.2	35.4	120.4	-2.2	118.2	43.1	-18.4	24.8
78	1,026.5	-6.0	1,020.5	24.4	-2.4	22.0	38.9	-.3	38.6	195.3	-3.5	191.8	60.5	-20.6	39.9
79	683.8	-8.9	674.9	60.4	-4.8	55.6	53.5	-.3	53.2	256.7	-5.4	251.3	16.1	-17.9	-1.8
80	1,010.9	-7.3	1,003.6	-4.7	-3.5	-8.2	64.5	-.5	64.0	292.4	-7.9	284.5	-9.9	-13.8	-23.7
81	1,289.0	-10.2	1,278.8	-11.8	-3.2	8.6	92.7	-.6	92.1	277.2	-5.0	272.2	-62.1	-6.3	-68.4
82	939.8	-6.8	933.0	30.5	-2.0	28.5	97.3	-.5	96.8	313.5	-3.4	310.1	-82.1	-8.3	-90.4
83	848.4	-5.6	842.7	48.0	-2.2	45.8	108.8	-.5	108.3	414.0	-5.6	408.4	-79.8	-12.6	-92.4
84	733.7	-6.0	727.7	72.5	-2.5	70.0	132.6	-.6	132.0	353.4	-8.3	345.1	-70.2	-13.2	-83.4

Source: Rural Development Administration, Standard Incomes of Crops and Livestock, various issues.
Also see Table 13a, 13e and Appendix 33a.

a/ Direct short-run effect on foreign exchange gain or loss of price interventions for each product was measured by:

$$\Delta E_i = (\Delta Q_i' - \Delta D_i') P_i^B - \Delta I_i' P_{Ii}^B$$

where ΔE_i = Gain in foreign exchange earnings

$\Delta Q_i'$ = Change in output in the absence of short-run direct price interventions

$\Delta D_i'$ = Change in consumption in the absence of direct price interventions

$\Delta I_i'$ = Change in the use of tradable inputs to produce i in the absence of short-run direct price interventions

P_i^B = Border price of product i in U.S. dollars

P_{Ii}^B = Border price of input in U.S. dollars

Appendix 40b. Direct Cumulative Effect on Foreign Exchange Earnings by Commidity[a/]

Unit: million US dollars

Year	Rice			Barley			Soybean			Beef			Pork		
	Output	Input	Total	Output	Input	Total	Output	Input	Total	Output	Input	Total	Output	Input	Total
1960															
61															
62	59.2	-.5	58.7	28.5	-.7	27.8	3.2	-.0	3.2	2.8	.0	2.8	4.4	-2.6	1.8
63	97.2	-.8	96.4	23.9	-.6	23.3	3.9	-.0	3.9	2.8	.0	2.8	5.3	-3.1	2.2
64	117.0	-1.7	115.3	54.0	-2.0	52.0	5.8	-.1	5.7	2.2	.0	2.2	9.2	-3.2	6.0
65	78.8	-1.1	77.7	52.7	-2.0	50.7	6.2	-.1	6.1	-.7	.0	-.7	7.5	-3.8	3.7
66	43.2	-.6	42.6	87.8	-1.9	85.8	6.8	-.1	6.7	-2.6	.0	-2.6	12.0	-7.1	4.9
67	22.7	-.3	22.4	60.9	-1.7	59.2	8.8	-.1	8.6	-.9	.0	-.9	11.0	-5.2	5.8
68	13.2	-.2	13.0	33.1	-1.1	32.0	11.9	-.2	11.7	4.7	-.1	4.7	12.5	-6.1	6.4
69	42.1	-.4	41.7	23.8	-.9	22.9	11.0	-.2	10.8	9.3	-.1	9.2	21.1	-8.2	12.9
70	65.4	-.4	65.0	28.1	-.8	27.3	13.7	-.2	13.5	13.2	-.6	12.6	24.4	-12.4	12.0
71	141.9	-.8	141.0	19.3	-1.0	18.3	18.2	-.2	18.0	14.1	-.8	13.3	27.6	-15.0	12.6
72	170.4	-1.5	168.8	36.3	-1.5	34.8	15.8	-.2	15.6	12.6	-.7	11.9	33.0	-13.3	19.7
73	351.7	-2.6	349.1	64.3	-2.2	62.1	26.7	-.3	26.4	22.1	-1.4	20.7	37.3	-22.7	14.6
74	469.9	-2.3	467.6	117.1	-2.0	115.2	38.0	-.3	37.7	29.0	-2.2	26.8	58.7	-31.2	27.5
75	441.8	-1.5	440.3	98.8	-1.9	96.9	34.2	-.3	33.9	47.1	-2.7	44.4	55.0	-33.2	21.8
76	474.8	-2.4	472.4	19.3	-1.9	17.4	37.0	-.3	36.7	76.0	-2.9	73.1	69.9	-30.4	39.5
77	627.6	-5.2	622.4	-16.1	-1.2	-17.2	57.2	-.4	56.8	134.6	-3.4	131.2	89.3	-34.6	54.7
78	1,184.8	-7.9	1,176.9	54.2	-3.4	50.8	53.8	-.5	53.3	212.1	-5.0	207.1	159.5	-41.7	117.8
79	796.7	-11.9	784.8	102.1	-6.6	95.5	71.2	-.6	70.6	290.2	-8.1	282.1	163.5	-57.4	106.1
80	1,183.3	-10.6	1,172.7	36.9	-5.3	31.6	78.4	-.8	77.6	353.6	-14.0	339.6	124.0	-63.4	60.6
81	1,587.0	-14.9	1,572.1	77.0	-5.5	71.5	112.0	-1.0	111.0	331.2	-10.0	321.2	103.5	-42.1	61.4
82	1,300.4	-11.0	1,289.4	78.5	-3.7	74.8	110.2	-.7	109.5	349.8	-6.2	343.6	68.4	-31.2	37.2
83	1,258.2	-9.7	1,248.6	94.2	-3.8	90.4	123.1	-.7	122.4	457.2	-9.4	447.8	24.6	-41.0	-16.5
84	1,177.0	-10.8	1,166.2	138.4	-4.4	133.9	151.4	-.9	150.5	406.1	-13.6	392.5	15.6	-40.5	-24.9

Source: Rural Development Administration, Standard Incomes of Crops and Livestock, various issues.
Also see Table 13b, 13e and Appendix 33a.

a/ Direct cumulative effect on foreign exchange gain or loss of price interventions for each product was measured by:

$$\Delta E_i = (\Delta Q_i' - \Delta D_i') P_i^B - \Delta I_i' P_{Ii}^B$$

where ΔE_i = Gain in foreign exchange earnings

$\Delta Q_i'$ = Change in output in the absence of direct price interventions

$\Delta D_i'$ = Change in consumption in the absence of direct price interventions

$\Delta I_i'$ = Change in the use of tradable inputs to produce i in the absence of direct price interventions

P_i^B = Border price of product i in U.S. dollars

P_{Ii}^B = Border price of input in U.S. dollars

Appendix 40c. Total Short-Run Effect on Foreign Exchange Earnings by Commodity[a/]

Unit: million US dollars

Year	Rice			Barley			Soybean			Beef			Pork		
	Output	Input	Total	Output	Input	Total	Output	Input	Total	Output	Input	Total	Output	Input	Total
1962	-63.3	.4	-62.9	12.2	-.0	12.2	-1.8	.0	-1.8	-.7	.1	-.6	-5.4	2.9	-2.5
63	-43.5	.2	-43.3	10.1	-.1	10.0	-.3	.0	-.3	-1.4	.1	-1.4	-3.5	1.7	-1.8
64	-67.5	.5	-67.0	8.0	0	8.0	.3	.0	.3	-3.6	.1	-3.5	-3.8	1.3	-2.5
65	-71.3	.4	-70.9	14.0	-.2	13.7	-.1	-.0	-.1	-3.7	.1	-3.6	-2.4	1.4	-1.0
66	-96.5	.7	-95.8	1.9	.2	2.2	.3	-.0	.2	-5.2	.1	-5.0	-4.8	4.5	-.3
67	-112.7	1.0	-111.6	-23.2	.9	-22.4	.6	-.0	.6	-4.5	.1	-4.4	-1.5	1.6	.1
68	-101.8	.8	-101.0	-24.1	1.0	-23.0	.9	-.0	.9	-2.8	.1	-2.7	2.0	-.6	1.4
69	-113.1	.9	-112.2	-7.9	.5	-7.4	1.2	-.0	1.2	1.0	.0	1.1	4.6	-1.4	3.2
70	-81.8	.6	-81.3	-8.7	.3	-8.4	3.4	-.0	3.3	.0	.1	.1	6.9	-3.0	3.9
71	3.7	.2	3.9	-6.5	.0	-6.5	3.8	-.0	3.7	.0	.1	.1	8.0	3.5	4.5
72	1.6	-.4	1.3	22.0	-.4	21.6	3.2	-.0	3.1	-2.5	.0	-2.5	11.2	-3.7	7.5
73	10.8	-.6	10.2	43.5	-.7	42.8	3.0	-.0	2.9	1.7	.0	1.7	11.7	-6.8	5.0
74	-129.2	-.2	-129.4	67.9	-.3	67.6	2.6	-.0	2.5	3.6	.0	3.6	9.2	-4.2	5.0
75	-25.6	.6	-25.0	-72.7	.4	-72.3	1.0	-.0	1.0	15.7	.2	15.9	7.7	-5.0	2.7
76	205.8	-0.4	205.4	-104.9	1.0	-103.9	7.6	-.0	7.5	43.4	-.6	42.9	9.6	-5.0	4.6
77	391.2	-2.8	388.4	-41.8	-.2	-41.9	22.9	-.1	22.8	95.9	-1.4	94.5	20.0	-10.8	9.3
78	779.7	-4.6	775.1	12.1	-1.7	10.4	28.8	-.2	28.6	163.8	-2.8	161.0	19.3	-12.9	6.3
79	529.2	-7.0	522.2	48.3	-4.0	44.3	40.2	-.3	39.9	214.8	-4.3	210.6	-32.2	-5.7	-37.9
80	778.5	-5.6	772.9	1.3	-3.3	-2.0	49.4	-.4	49.0	238.0	-6.2	231.8	-64.5	4.6	-59.9
81	1,009.6	-7.8	1,001.7	2.9	-2.6	.4	75.5	-.5	75.0	205.2	-3.3	201.9	-120.1	10.8	-109.3
82	806.0	-5.2	800.7	18.4	-1.7	16.8	84.7	-.4	84.3	283.8	-2.8	281.0	-200.6	9.7	-190.9
83	686.7	-4.5	682.2	40.9	-1.9	39.0	98.0	-.4	97.5	378.0	-4.7	373.3	-159.6	9.2	-150.4
84	598.3	-5.0	593.3	63.8	-2.2	61.6	114.7	-.6	114.1	325.5	-7.4	318.1	-140.4	8.3	-132.1

Source: Rural Development Adminstration, Standard Incomes of Crops and Livestock, various issues. Also see Table 13c, 13f and Appendix 33a.

a/ Total short-run effect on foreign exchange gain or loss of price interventions for each product was measured by:

$$\Delta E_i = (\Delta Q_i^* - \Delta D_i^*) P_i^B - \Delta I_i^* P_{Ii}^B$$

where ΔE_i = Gain in foreign exchange earnings

ΔQ_i^* = Change in output in the absence of short-run direct and indirect price interventions

ΔD_i^* = Change in consumption in the absence of direct and indirect price interventions

ΔI_i^* = Change in the use of tradable inputs to produce i in the absence of short-run direct and indirect price interventions

P_i^B = Border price of product i in U.S. dollars

P_{Ii}^B = Border price of Input in U.S. dollars

Appendix 40d. Total Cumulative Effect on Foreign Exchange Earnings by Commodity[a/]

Unit: million US dollars

Year	Rice			Barley			Soybean			Beef			Pork		
	Output	Input	Total	Output	Input	Total	Output	Input	Total	Output	Input	Total	Output	Input	Total
1960															
61															
62	-63.3	.4	-62.9	10.2	-.0	10.2	-1.8	.0	-1.8	-.7	.1	-.6	-5.4	2.9	-2.5
63	-66.7	.5	-66.2	10.1	-.1	10.0	-1.0	.0	-1.0	-2.8	.2	-2.6	-6.6	3.7	-2.9
64	-97.2	1.0	-96.2	13.7	-.2	13.5	-2.1	.0	-2.1	-6.5	.2	-6.3	-9.2	3.4	-5.8
65	-98.0	.7	-97.3	16.3	-.3	16.0	-1.5	.0	-1.5	-7.4	.3	-7.1	-7.1	4.1	-3.0
66	-131.5	1.2	-130.3	10.8	.0	10.8	-.4	.0	-.4	-10.3	.4	-9.9	-13.4	11.2	-2.2
67	-167.0	1.8	-165.2	-29.7	1.1	-28.6	.4	-.0	.4	-10.8	.4	-10.4	-8.5	6.2	-2.3
68	-162.6	1.6	-161.0	-64.9	2.3	-62.6	1.5	-.0	-1.5	-8.4	.3	-8.1	-2.5	2.2	-.3
69	-203.4	1.9	-201.5	-70.6	2.5	-68.1	2.2	-.0	2.2	-3.1	.2	-2.9	2.3	-.3	2.0
70	-161.1	1.3	-159.8	-85.9	2.1	-83.8	3.9	-.1	3.8	-3.3	.4	-2.9	7.4	-3.3	4.1
71	-45.4	.8	-44.6	-55.0	1.3	-53.7	6.4	-.1	6.3	-3.5	.4	-3.1	10.6	-5.2	5.4
72	-21.8	-.0	-21.8	-9.4	.5	-8.9	6.2	-.1	6.1	-5.0	.2	-4.8	15.7	-5.9	9.8
73	13.2	-.6	12.6	23.7	-.2	23.5	10.3	-.1	10.2	.0	.2	.2	18.6	-11.6	7.0
74	-75.1	-.5	-75.6	68.9	-.3	68.6	15.1	-.1	15.0	1.8	.2	2.0	26.5	-14.6	11.9
75	21.7	.3	21.4	-52.5	.2	-52.3	12.8	-.1	12.7	14.1	.4	14.5	23.1	-14.9	8.2
76	188.6	-.2	188.4	-112.0	1.1	-110.9	16.2	-.1	16.1	39.8	-.2	39.6	27.4	-13.0	14.4
77	396.1	-2.9	393.2	-51.3	.1	-51.2	33.0	-.2	32.8	97.9	-1.5	96.4	41.6	-18.4	23.2
78	872.1	-5.7	866.4	13.2	-1.7	11.5	37.0	-.3	36.7	172.2	-3.5	168.7	74.3	-24.7	49.6
79	618.2	-9.4	608.8	72.4	-5.0	67.4	52.9	-.5	52.4	239.9	-6.3	233.6	61.6	-30.8	30.8
80	928.9	-8.4	920.5	25.6	-4.3	21.3	60.8	-.6	60.2	289.0	-11.3	277.7	12.4	-23.9	-11.5
81	1,271.9	-11.9	1,260.0	60.9	-4.6	56.3	92.4	-.8	91.6	252.0	-7.7	244.3	-49.7	-4.5	-54.2
82	1,113.0	-8.8	1,104.2	62.1	-3.2	58.9	96.3	-.6	95.7	320.1	-5.7	314.4	-187.0	7.6	-179.3
83	1,024.4	-7.9	1,016.5	83.6	-3.4	80.2	111.1	-.6	110.5	417.6	-8.1	409.5	-187.3	16.8	-170.5
84	965.4	-8.9	956.6	126.7	-4.0	122.7	132.3	-.9	131.4	372.0	-12.0	360.0	-176.8	19.8	-157.0

Source: Rural Development Administration, Standard Incomes of Crops and Livestock, various issues. Also see Table 13d, 13f and Appendix 33a.

a/ Total cumulative effect on foreign exchange gain or loss of price interventions for each product was measured by:

$$\Delta E_i = (\Delta Q_i^* - \Delta D_i^*) P_i^B - \Delta I_i^* P_{Ii}^B$$

where ΔE_i = Gain in foreign exchange earnings

ΔQ_i^* = Change in output in the absence of direct and indirect price interventions

ΔD_i^* = Change in consumption in the absence of direct and indirect price interventions

ΔI_i^* = Change in the use of tradable inputs to produce i in the absence of direct and indirect price interventions

P_i^B = Border price of product i in U.S. dollars

P_{Ii}^B = Border price of input in U.S. dollars

Appendix 41. Subsidies on Main Foodcrop

Year	Per Unit Subsidy on Foodcrop				Total Subsidy on Foodcrop	Total Tariff on Imported Grain
	Producer Subsidy		Consumer Subsidy			
	Rice	Barley	Rice	Barley		
	₩1000/MT	₩1000/MT	₩1000/MT	₩1000/MT	Billion won	Billion won
1970	10.4	13.4	4.2	3.6	2.8	o.5
71	0.0	12.1	0.0	4.4	0.0	2.3
72	9.8	25.6	5.0	5.2	2.2	5.6
73	7.0	18.1	5.7	5.9	25.1	9.0
74	43.8	19.3	9.3	9.2	125.0	13.3
75	47.1	45.8	12.5	9.5	90.6	19.0
76	61.4	61.1	15.2	11.4	20.8	13.5
77	69.1	86.4	21.2	16.1	37.9	15.1
78	75.6	136.4	31.8	26.6	113.3	14.5
79	102.0	219.4	44.5	64.2	142.5	29.8
80	82.8	197.1	60.9	82.0	121.9	38.4
81	42.7	224.7	56.7	89.5	12.4	47.9
82	104.7	137.4	58.5	61.9	-6.2	34.1
83	138.5	104.4	92.4	65.4	141.3	48.3
84	144.0	170.0	101.6	68.6	207.2	61.7

Source: Ministry of Agriculture and Fisheries, Food Bureau, various issues.
Office of Customs Administration, Statistical Yearbook of Foreign Trade, various issues.

Appendix 42. Revenue and Expenditures due to Agricultural Pricing Policy

Unit: Billion won

Year	Revenue				Expenditures					Net Expenditures
		Profits from Imported			Price Subsidy					
	Tariff	Meat	Misc. Products[a]	Total	Grain[b]	Fertilizer[c]	Machinery	Livestock	Total	
1970	0.5	-	-	0.5	2.8	4.2	1.4	-	8.4	7.9
71	2.3	-	(-)0.4	1.9	0.0	6.0	-	-	6.0	4.1
72	5.6	-	(-)0.3	5.3	2.2	9.8	-	-	12.0	6.7
73	9.0	-	(-)0.5	8.5	25.1	13.0	-	-	13.0	4.5
74	13.3	-	(-)0.2	13.1	125.1	30.1	-	-	155.1	142.0
75	19.0	-	-	19.0	90.6	63.5	0.5	-	154.6	135.6
76	13.5	-	(-)0.1	13.4	20.8	-11.1	-	0.3	10.0	-3.4
77	15.1	1.6	(-)0.3	16.4	37.9	-0.3	0.1	1.1	28.8	22.4
78	14.5	53.1	(-)0.5	67.1	113.3	9.8	1.7	0.9	125.7	58.6
79	29.8	30.0	3.1	62.9	142.5	33.4	0.9	1.7	178.5	115.6
80	38.4	10.6	35.4	84.4	121.9	85.9	1.3	1.5	210.6	126.2
81	47.9	43.3	19.9	111.4	12.4	102.3	2.1	5.0	121.8	10.7
82	34.1	86.6	24.5	145.2	-6.2	55.5	-	3.4	52.7	-92.5
83	48.3	73.7	27.5	149.2	141.3	33.6	-	2.5	177.4	27.9
84	61.7	30.4	28.9	120.4	207.2	39.4	-	3.1	249.7	129.3

Source: The Office of Customs Administration, Statistical Yearbook of Foreign Trade, various issues.
The Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues.
The Economic Planning Board, The Summary of Government Budget, various issues.
The Union of Livestock Cooperatives, Livestock Products Demand and Supply, 1985.
The National Agricultural Cooperatives Federation, Fertilizer Yearbook, various issues.

a/ Negative figures represent loss in sales.
b/ Represents the total deficit in grain operation due to producer and consumer subsidies, but excludes interest payments on the long-term draft of funds from the Bank of Korea and on the short-term grain bonds.
c/ Represents the total deficit in the Fertilizer Account due to price subsidies for farmers and manufacturers, but excludes interest payments on the long-term draft of funds from the Bank of Korea.

Appendix 43. Actual Interest Rates and Implicit Subsidy Rates by Major Category of Agricultural Credit, 1962-84

(Unit: %)

Year	Actual Interest Rate			Inflation Rate	Reference Nominal Rate[a/]	Implicit Subsidy Rate[b/]		
	Short-Term	Intermediate-Term	Irrigation-Loan			Short-Term	Intermediate-Term	Irrigation-Loan
1962	15.0	9.0	3.5	8.8	19.7	4.7	10.7	16.2
63	15.0	9.0	3.5	20.5	32.3	17.3	23.3	28.8
64	15.0	9.0	3.5	35.1	48.6	33.6	39.6	45.1
65	15.0	9.0	3.5	10.3	21.3	6.3	12.3	17.8
66	15.0	9.0	3.5	8.6	19.5	4.5	10.5	16.0
67	15.0	9.0	3.5	6.5	17.2	2.2	8.2	13.7
68	15.0	9.0	3.5	8.1	18.9	3.9	9.9	15.4
69	15.0	9.0	3.5	6.9	17.6	2.6	8.6	14.1
70	15.0	9.0	3.5	9.4	20.0	5.0	11.0	16.5
71	15.0	9.0	3.5	8.6	19.5	4.5	10.5	16.0
72	13.8	9.0	3.5	13.8	25.2	11.4	16.2	21.7
73	12.0	9.0	3.5	6.9	17.6	5.6	8.6	14.1
74	12.0	9.0	5.0	42.1	56.3	44.3	47.3	51.3
75	12.0	9.0	5.0	26.5	39.2	27.2	30.2	34.2
76	12.4	9.2	5.0	12.2	23.4	11.0	14.2	18.4
77	13.0	10.2	5.0	9.0	19.9	6.9	9.7	14.9
78	13.0	10.5	5.0	11.6	22.8	9.8	12.3	17.8
79	14.8	11.5	5.0	18.8	30.7	15.9	19.2	25.7
80	15.0	12.5	5.0	38.9	52.8	37.8	40.3	47.8
81	15.0	17.9	5.0	20.4	32.4	17.4	14.5	27.4
82	11.7	16.3	5.0	4.7	15.2	3.5	(-)1.1	10.2
83	10.0	12.0	5.0	.2	10.2	.2	(-)1.8	5.2
84	10.0	10.0	5.0	.7	10.8	.8	.8	5.8

Source: National Agricultural Cooperatives Federation, Agricultural Cooperatives Yearbook, various issues.
The Bank of Korea, The Economic Statistics Yearbook, various issues.

a/ Reference nominal interest rate = $(1 + r_t^*)(1 + \pi_t) - 1$

where: r_t^* = Real reference interest rate in the absence of subsidy

π_t = Inflation rate

b/ Implicit subisdy rate = reference nominal interest rate - i_t

where: i_t = Actual nominal interest rate charged

Appendix 44. Transfer to Agriculture (Implicit Credit Subsidy)

Unit: billion won

Year	Short-Term			Intermediate Term			Long-Term Irrigation			Total Credit Subsidy
	Balance a/	Subsidy Ratio b/	Subsidy c/	Balance	Subsidy Ratio	Subsidy	Balance	Subsidy Ratio	Subsidy	
1962	9.9	.047	.5	0.4	.107	-	6.1	.162	1.0	1.5
63	9.5	.173	1.6	1.0	.233	.2	6.6	.288	1.9	3.7
64	10.3	.336	3.5	1.0	.396	.4	7.0	.451	3.2	7.1
65	12.1	.063	.8	1.6	.123	.2	7.6	.178	1.4	2.4
66	12.0	.045	.5	3.4	.105	.4	6.3	.160	1.0	1.9
67	14.2	.022	.3	3.7	.082	.3	6.7	.137	.9	1.5
68	16.2	.039	.6	5.1	.099	.5	7.9	.154	1.2	2.3
69	18.7	.026	.5	11.4	.086	1.0	9.6	.141	1.4	2.9
70	22.1	.050	1.1	30.5	.110	3.4	11.5	.165	1.9	6.4
71	25.5	.045	1.1	38.1	.105	4.0	13.7	.160	2.2	7.3
72	31.8	.114	3.6	44.7	.162	7.2	11.8	.217	2.6	13.4
73	44.0	.056	2.5	52.9	.086	4.5	14.1	.141	2.0	9.0
74	45.1	.443	20.0	60.0	.473	28.4	16.0	.513	8.2	56.6
75	92.4	.272	25.1	79.8	.302	24.1	17.9	.342	6.1	55.3
76	84.5	.110	9.3	113.4	.142	16.1	22.7	.184	4.2	29.6
77	105.2	.069	7.3	148.7	.097	14.4	29.6	.149	4.4	26.1
78	138.5	.098	13.6	190.7	.123	23.5	40.4	.178	7.2	44.3
79	124.0	.159	19.7	357.2	.192	68.6	47.3	.257	12.2	100.5
80	133.9	.378	50.6	529.5	.403	213.4	61.6	.478	29.4	293.4
81	253.3	.174	44.1	670.8	.145	97.3	74.8	.274	20.5	161.9
82	274.5	.035	9.6	715.8	(-).011	(-)7.9	95.3	.102	9.7	11.4
83	298.6	.002	.6	987.0	(-).018	(-)17.8	125.5	.052	6.5	(-)10.7
84	366.1	.008	2.9	1,211.5	.008	9.7	154.1	.058	8.9	21.5

Source: National Agricultural Cooperatives Federation, Agricultural Cooperatives Yearbook, various issues.

a/ Outstanding balance at the year-beginning

b/ Subsidy ratio = $(1 + r_t^*)(1 + \pi_t) - (1 + i_t)$

c/ Amount of subsidy = balance X subsidy ratio

Appendix 45a. Direct and Total Nominal Transfers due to Output Price and Input Price Interventions out of (-) and into (+) Agriculture (in billions units of Korean currency of 1980)

Year	Transfers on Output Prices [a/]											
	Rice		Barley		Soybean		Beef		Pork		All Products	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1962	114.1	-969.0	36.6	-257.7	4.2	-38.0	1.1	-28.5	22.5	-47.9	178.5	-1341.1
63	685.9	-729.4	223.5	30.6	23.5	20.0	2.5	-36.4	20.0	-43.5	955.4	-758.7
64	219.1	-1100.0	147.3	-118.2	20.9	20.9	-10.2	-55.3	5.5	-60.9	382.6	-1313.5
65	-108.8	-944.0	73.6	-96.8	15.2	15.2	-.9	-29.6	12.0	-24.0	-8.9	-1079.2
66	-50.7	-1318.6	-124.3	-550.7	17.1	21.4	-1.3	-48.9	7.1	-80.7	-152.1	-1977.5
67	-131.2	-1005.8	-85.7	-367.5	40.9	9.1	9.7	-26.6	26.0	-18.8	-140.3	-1409.6
68	50.3	-739.8	18.7	-231.6	14.6	-26.9	24.9	-18.9	49.7	8.8	158.2	-1008.4
69	187.5	-764.6	75.5	-123.4	22.4	-6.3	18.1	-20.4	26.0	-24.0	329.5	-938.7
70	231.4	-528.3	14.3	-182.5	42.2	16.1	21.4	-17.3	47.1	5.4	356.4	-706.6
71	663.6	.0	139.1	-13.8	25.3	6.3	25.9	-20.4	61.3	14.2	915.2	-13.7
72	892.2	552.7	202.8	110.2	35.7	17.7	36.3	7.0	33.9	3.5	1200.9	691.1
73	156.2	-184.6	56.2	-44.2	21.6	2.1	20.5	-11.6	57.2	30.8	311.7	-207.5
74	15.0	-1113.0	-19.9	-217.1	25.8	-24.9	17.4	-24.9	18.3	-42.4	56.6	-1422.3
75	434.5	-729.2	-28.8	-268.1	33.8	-4.9	37.4	-15.0	58.2	1.8	535.1	-1015.4
76	1395.2	1104.0	106.0	28.6	63.3	48.2	107.5	80.6	85.0	53.0	1757.0	1314.4
77	1765.2	1603.0	142.5	125.4	87.8	76.0	157.1	139.0	82.4	55.6	2235.0	1999.0
78	1432.0	1207.9	255.4	228.0	90.7	82.0	227.4	210.4	83.6	33.2	2089.1	1761.5
79	1996.8	1698.1	293.3	241.1	33.5	19.4	182.9	140.8	4.4	-99.6	2510.9	1999.8
80	1150.2	899.5	128.9	91.4	73.6	61.8	144.3	88.4	64.4	-39.0	1561.1	1102.1
81	1457.5	1171.2	119.1	87.5	113.6	102.7	165.4	134.3	-125.6	-61.7	1730.0	1434.0
82	1380.6	1172.6	145.0	130.1	95.0	89.5	195.7	177.7	-47.6	-142.7	1768.7	1427.2
83	1203.0	1053.1	161.6	151.0	99.1	95.2	215.4	200.7	-17.9	24.8	1661.2	1524.8
84	1248.6	991.2	122.0	109.7	103.1	97.5	281.8	267.1	24.8	-21.6	1680.3	1443.9

Appendix 45a. Con'd.

Year	Transfers on Purchased Inputs							Sum of Transfers on All Product and Input Prices		Sum of Transfers as a Share of GDP_A	
	Fertilizer		Feed		Credit [b/]	All Inputs					
	Direct	Total	Direct	Total		Direct	Total	Direct	Total	Direct	Total
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(11)+(18)	(12)+(19)	(%)	(%)
1962	-21.0	9.6	-7.5	23.1	21.1	-7.4	46.4	171.3	-1287.3	9.6	-72.1
63	-16.4	7.5	-6.6	23.2	43.5	20.6	74.2	975.9	-684.5	39.1	-27.4
64	-.3	48.1	-6.6	18.2	64.5	57.6	130.8	440.2	-1182.7	15.0	-40.2
65	-15.1	19.2	-5.3	12.1	19.2	-1.2	50.5	-17.3	-1028.7	-.7	-44.4
66	-13.6	22.3	-9.6	15.4	13.6	-9.6	51.3	-161.5	-1928.7	-6.6	-79.4
67	8.6	54.0	-8.0	15.3	9.7	10.3	79.0	-129.8	-1330.7	-5.5	-56.6
68	4.4	48.4	-10.4	20.3	13.5	7.5	82.2	165.6	-926.2	6.5	-36.2
69	-3.1	35.6	-9.3	16.6	15.1	2.7	67.3	332.2	-871.3	11.4	-29.9
70	-10.5	20.7	-11.0	16.2	28.7	7.2	65.6	363.7	-640.9	12.1	-21.3
71	-9.9	28.2	-13.4	19.3	28.9	5.6	76.4	890.7	62.7	26.9	1.9
72	5.7	26.8	-9.2	9.2	47.3	44.9	83.4	1244.7	784.2	34.5	21.7
73	26.9	51.8	-9.2	8.6	30.8	48.5	91.2	360.2	-116.3	10.3	-3.3
74	1.9	35.5	-13.0	15.2	156.8	145.6	207.5	212.1	-1205.9	4.4	-25.1
75	-26.1	3.5	-17.3	14.2	122.3	79.0	140.0	614.0	-875.4	12.0	-17.1
76	-56.0	-45.3	-13.6	6.9	56.8	-12.8	18.4	1744.3	1323.8	29.9	22.7
77	-40.8	-31.8	-11.1	7.3	45.5	-6.4	21.0	2228.6	2019.9	35.9	32.5
78	-43.2	-32.0	-17.4	13.1	67.4	6.8	48.5	2095.9	1810.1	31.0	26.8
79	-7.9	19.5	-27.4	22.0	129.3	94.1	170.9	2604.7	2170.4	38.9	32.4
80	15.7	49.7	-29.8	23.8	293.4	279.3	366.9	1840.4	1431.6	37.9	29.5
81	-16.1	4.4	-21.1	10.6	134.3	97.1	149.3	1827.0	1585.2	33.1	28.7
82	-32.2	-23.7	-22.4	11.1	8.8	-45.9	-3.8	1722.8	1423.5	31.9	26.4
83	-40.6	-34.7	-18.2	8.8	-8.0	-66.8	-33.9	1595.0	1491.6	28.8	26.9
84	-34.5	-28.5	-14.8	6.7	15.6	-33.6	-6.2	1646.7	1437.7	27.3	23.3

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues
_____, The Cost of Production Survey, various issues
National Agricultural Cooperatives Federation, The Rural Price and Wage Survey, various issues
_____, Fertilizer Yearbook, various issues
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues
Economic Planning Board, The Summary of Government Budget, various issues
The Bank of Korea, The Price Survey, various issues
_____, The Economic Statistics Yearbook, various issues
FAO, Trade Yearbook, various issues

a/ All figures were deflated by CPI(1980=100.0)
Direct and total transfers calculated by:

$$\text{Direct transfer} = (P_A - P_A^{\dagger}) Q_A$$

$$\text{Total transfer} = (P_A - P_A^{*}) Q_A$$

where P_A = Domestic producer price of product A
$P_A^{\dagger}$ = Border price of product A evaluated at the nominal exchange rate E_o
P_A^{*} = Border price of product A evaluated at the free trade equilibrium exchange rate E*
Q_A = Output of Product A

b/ Agricultural credit subsidy calculated by:

$$S_t = C_t[(1+r_t^{*})(1+\pi_t) - (1+i_t)]$$

where S_t = Amount of credit subsidy
C_t = Credit allocated to agriculture
r_t^{*} = Real reference interest rate in the absence of subsidy(10%)
π_t = Inflation rate
i_t = Actual nominal interest rate charged

Appendix 45b. Direct and Total Nominal Transfers due to Value-Added and Non-Allocatable Input Price Interventions out of(-) and into(+) Agriculture (in billions units of Korean currency of 1980)

Year	Transfers on Value-Added [a/]											
	Rice		Barley		Soybean		Beef		Pork		All Products	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1962	101.1	-965.2	28.2	-254.9	3.5	-37.7	0.1	-25.2	16.1	-28.1	154.0	-1311.1
63	677.6	-725.3	218.0	32.4	22.9	20.3	1.3	-32.2	14.6	-24.7	934.4	-729.3
64	219.1	-1078.8	147.3	-104.3	20.9	22.6	-11.5	-51.6	0.2	-46.4	376.0	-1258.5
65	-114.4	-937.6	70.4	-92.0	14.6	16.0	-2.2	-26.7	0.8	-14.8	-30.8	-1055.1
66	-55.7	-1309.3	-127.9	-545.0	16.6	22.3	-3.2	-46.3	-0.5	-70.1	-170.7	-1948.4
67	-127.9	-984.4	-83.1	-352.6	41.2	11.0	7.7	-22.7	20.1	-7.5	-142.0	-1356.2
68	50.0	-719.9	19.9	-215.8	14.9	-24.1	21.8	-13.0	42.4	23.2	151.0	-949.6
69	185.9	-745.3	74.5	-112.5	22.2	-4.5	15.5	-15.7	19.3	-12.1	317.4	-890.1
70	226.5	-517.9	11.7	-175.8	44.7	17.5	18.4	-12.9	39.1	17.2	340.4	-671.9
71	629.2	15.0	136.4	-5.5	24.8	7.7	22.3	-15.2	51.4	28.3	864.1	30.3
72	896.5	572.4	205.3	122.6	36.0	19.4	33.2	10.1	27.8	9.6	1198.8	734.1
73	172.6	-153.1	64.4	-28.1	23.3	5.5	17.5	-9.2	51.0	37.0	328.8	-147.9
74	16.1	-1088.9	-19.4	-207.2	26.0	-22.2	23.3	-19.9	9.4	-32.1	55.4	-1370.3
75	420.6	-727.4	-36.1	-267.0	32.3	-4.6	32.1	-10.8	46.2	11.7	495.1	-998.1
76	1365.8	1080.2	93.5	18.6	60.3	45.7	102.9	82.9	76.0	57.6	1698.5	1285.0
77	1741.3	1584.3	137.1	121.3	84.7	73.5	153.3	141.6	75.1	60.3	2191.5	1981.0
78	1408.4	1190.4	246.6	221.5	88.1	80.1	222.4	214.2	71.2	42.5	2036.7	1748.7
79	1991.6	1710.9	291.2	246.1	33.2	20.2	174.5	147.7	-14.7	-84.6	2475.8	2040.3
80	1157.0	920.9	131.1	98.3	74.5	64.5	135.6	95.4	43.0	-22.2	1541.2	1156.9
81	1449.5	1173.4	117.2	88.0	112.5	103.0	158.9	137.5	-140.3	-52.6	1697.8	1449.3
82	1359.6	1157.2	140.3	126.6	92.8	87.9	190.7	180.2	-65.0	-134.0	1718.4	1417.9
83	1179.0	1032.6	156.0	146.2	96.6	93.1	211.4	203.0	-31.4	32.0	1611.6	1506.9
84	1129.3	975.3	117.7	106.2	101.0	95.7	277.5	269.1	14.4	-16.9	1639.9	1429.4

Appendix 45b. Cont'd

Year	Transfers on Purchased Inputs Not Allocatable					Suar of Transfers on All Product and Input Prices		Sum of Transfers as a Share of GDP_A	
	Other Inputs		Credit	All Inputs					
	Direct	Total		Direct	Total	Direct	Total	Direct	Total
	(13)	(14)	(15)	(16)	(17)	(11)+(16)	(12)+(17)	(%)	(%)
1962	-3.8	2.7	21.1	17.3	23.8	171.3	-1287.3	9.6	-72.1
63	-2.0	1.3	43.5	41.5	44.8	975.9	-684.5	39.1	-27.4
64	-0.3	11.3	64.5	54.2	75.8	440.2	-1182.7	15.0	-40.2
65	-5.7	7.2	19.2	13.5	26.4	-17.3	-1028.7	-0.7	-44.4
66	-4.4	6.4	13.6	9.2	20.0	-161.5	-1928.4	-6.6	-79.4
67	2.5	15.8	9.7	12.2	25.5	-129.8	-1330.7	-5.5	-56.6
68	1.1	9.9	13.5	14.6	23.4	165.6	-926.2	6.5	-36.2
69	-0.3	3.7	15.1	14.8	18.8	332.2	-871.3	11.4	-29.9
70	-5.4	2.3	28.7	23.3	31.0	363.7	-640.9	12.1	-21.3
71	-2.3	3.5	28.9	26.6	32.4	890.7	62.7	26.9	1.9
72	-1.4	2.8	47.3	45.9	50.1	1244.7	784.2	34.5	21.7
73	0.6	0.8	30.8	31.4	31.6	360.2	-116.3	10.3	-3.3
74	-0.1	7.6	156.8	156.7	164.4	212.1	-1205.9	4.4	-25.1
75	-3.4	0.4	122.3	118.9	122.7	614.0	-875.4	12.0	-17.1
76	-11.0	-18.0	56.8	45.8	38.8	1744.3	1323.8	29.9	22.7
77	-8.4	-6.6	45.5	37.1	38.9	2228.6	2019.9	35.9	32.5
78	-8.2	-6.0	67.4	59.2	61.4	2095.9	1810.1	31.0	26.8
79	-0.4	0.8	129.3	128.9	130.1	2604.7	2170.4	38.9	32.4
80	5.8	-18.7	293.4	299.2	274.7	1840.4	1431.6	37.9	29.5
81	-5.1	1.6	134.3	129.2	135.9	1827.0	1585.2	33.1	28.7
82	-4.4	-3.2	8.8	4.4	5.6	1722.8	1423.5	31.9	26.4
83	-8.6	-7.3	-8.0	-16.6	-15.3	1595.0	1491.6	28.8	26.9
84	-8.8	-7.3	15.6	6.8	8.3	1646.7	1437.7	27.3	23.9

Source: Ministry of Agriculture and Fisheries, Agricultural Statistics Yearbook, various issues
_____, The Cost of Production Survey, various issues
National Agricultural Cooperatives Federation, The Rural Price and Wage Survey, various issues
_____, Fertilizer Yearbook, various issues
National Livestock Cooperatives Federation, Demand and Supply of Livestock Products, various issues
Economic Planning Board, The Summary of Government Budget, various issues
The Bank of Korea, The Economic Statistics Yearbook, various issues
_____, The Price Survey, various issues
FAO, Trade Yearbook, various issues

a/ All figures were deflated by CPI (1980 = 100.0)
Direct and total transfers on value-added estimated by:

$$\text{Direct transfer} = (VA_A - VA'_A)Q_A$$

$$\text{Total transfer} = (VA_A - VA^*_A)Q_A$$

where $VA_A = P_A - \sum_j a_{Aj}P_j$

$VA'_A = P'_A - \sum_j a_{Aj}P'_j$

$VA^*_A = P^*_A - \sum_j a_{Aj}P^*_j$

P_j = Price of purchased input j paid by farmers

P'_j = Border price of purchased input j evaluated at official exchange rate E_o

P^*_j = Border price of purchased input j evaluated at free trade equilibrium exchange rate E^*

Q_A = Output of product A

a_{Aj} = Technical coefficient

Appendix .45c. Nominal Transfers into(+)/ out of(-) Agriculture

(in billions of units of Korean currency of 1980)

Year	Non-Price Transfers					Price-Related Transfers		Total of Price-Related & Non-Price Transfers		Total as a Share of GDP_A	
	Tax & Misc. Charges	Public Investment	Research & Extension	Others	Sub-Total	Direct	Total	Direct	Total	Direct	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(5)+(6)	(5)+(7)	(%)	(%)
1962	-50.7	97.2	5.6	-	52.1	171.3	-1287.3	223.4	-1235.2	12.5	-69.2
63	-55.3	52.9	5.9	-	3.5	975.9	-684.5	979.4	-681.0	39.3	-27.3
64	-60.9	34.5	6.4	-	-20.0	440.2	-1182.7	420.2	-1202.7	14.3	-40.9
65	-61.6	48.8	6.4	-	-6.4	-17.3	-1028.7	-23.7	-1035.1	-1.0	-44.7
66	-60.7	94.3	7.1	-	40.7	-161.5	-1928.4	-120.8	-1887.7	-5.0	-77.7
67	-44.2	79.2	7.1	-	42.2	-129.8	-1330.7	-87.6	-1288.5	-3.7	-54.8
68	-45.6	145.0	8.8	-	108.2	165.6	-926.2	273.8	-818.0	10.7	-32.0
69	-57.3	218.8	10.4	-	171.9	332.2	-871.3	504.1	-699.4	17.3	-24.0
70	-36.8	211.7	7.6	-	182.5	363.7	-640.9	546.2	-458.4	18.1	-15.2
71	-40.3	221.3	19.8	6.7	207.5	890.7	62.7	1098.2	270.2	33.2	8.2
72	-37.1	207.4	13.8	39.2	223.3	1244.7	784.2	1468.0	1007.5	40.6	27.9
73	-53.8	196.9	12.3	26.4	181.8	360.2	-116.3	542.0	65.5	15.5	1.9
74	-57.6	195.6	13.9	38.5	190.3	212.1	-1205.9	402.4	-1015.6	8.4	-21.2
75	-66.8	269.0	12.6	39.6	254.4	614.0	-875.4	868.4	-621.0	17.0	-12.2
76	-87.5	318.2	18.6	49.1	298.5	1744.3	1323.8	2042.8	1622.3	35.1	27.8
77	-107.3	319.2	18.6	60.3	290.8	2228.6	2019.9	2519.4	2310.7	40.6	37.2
78	-107.0	358.8	19.8	57.7	329.2	2095.9	1810.1	2425.1	2139.3	35.9	31.6
79	-130.4	397.7	21.8	88.7	377.7	2604.7	2170.4	2982.4	2548.1	44.5	38.0
80	-131.2	348.5	18.7	68.7	304.7	1840.4	1431.6	2145.1	1736.3	44.2	35.8
81	-117.4	458.1	17.2	75.4	433.4	1827.0	1585.2	2260.4	2018.6	41.0	36.6
82	-110.8	429.0	19.0	55.3	392.5	1722.8	1423.5	2115.3	1816.0	39.2	33.7
83	-115.2	398.7	20.3	183.3	487.1	1595.0	1491.6	2082.1	1978.7	37.5	35.7
84	-117.2	431.8	19.1	179.5	513.2	1646.7	1437.7	2159.9	1950.9	35.8	32.4

Source: Economic Planning Board, The Summary of Government Budget, various issues
_____, Consumer Price Statistics, various issues
And also see Appendix 45a, 45b and 46.

Appendix 46./ Consumer Price Index

(1980 actual price = 100)

Year	Food Part of CPI			Non-Food Part of CPI		Consumer Price Index		
	Actual	Direct	Total	Actual & Direct	Total	Actual	Direct	Total
	CPI_A	CPI'_A	CPI^*_A	CPI_{NA}	CPI^*_{NA}	CPI	CPI'	CPI*
1960	4.7	4.3	5.3	7.7	7.5	6.1	6.3	6.6
61	5.1	4.9	6.0	8.3	10.9	6.6	6.9	8.9
62	5.5	5.4	6.9	8.7	12.2	7.1	7.3	10.0
63	7.3	6.5	8.4	9.5	13.7	8.5	8.3	11.5
64	10.0	9.8	12.0	11.8	15.1	11.0	11.0	13.8
65	10.8	11.0	12.7	14.2	16.9	12.5	12.9	15.2
66	11.6	11.9	13.8	17.0	19.3	14.0	14.9	17.0
67	12.5	12.9	15.0	19.0	21.2	15.4	16.5	18.7
68	13.8	13.6	16.1	21.1	24.1	17.1	18.0	20.8
69	16.0	15.6	18.2	23.1	26.1	19.2	20.0	22.8
70	19.4	18.7	21.2	25.6	28.5	22.3	22.8	25.5
71	23.1	21.3	23.7	27.4	30.9	25.3	24.9	27.9
72	26.2	22.6	24.1	30.2	31.0	28.3	27.1	28.2
73	26.9	26.7	28.5	31.4	31.0	29.2	29.5	30.0
74	34.3	34.3	39.3	38.0	40.4	36.1	36.5	39.9
75	45.2	45.3	50.4	45.1	47.4	45.2	45.2	48.6
76	53.3	47.0	48.6	51.1	50.1	52.1	49.4	49.5
77	59.5	50.5	51.5	55.6	53.6	57.4	53.5	52.8
78	69.4	62.8	64.6	62.5	62.5	65.7	62.6	63.4
79	79.0	68.9	72.0	76.6	79.7	77.7	73.4	76.5
80	100.0	86.8	91.7	100.0	104.3	100.0	94.6	99.1
81	127.5	111.3	115.7	117.0	118.7	121.3	114.7	117.5
82	130.7	114.3	117.8	129.7	131.6	130.1	123.4	125.9
83	132.4	116.2	118.7	136.0	136.3	134.5	127.9	129.1
84	134.4	123.9	126.0	139.8	139.1	137.6	133.3	133.7

Source: Economic Planning Board, Consumer Price Statistics Summary, various issues. and Also Table 6, Appendix 11 and 12.

Notes: $CPI'_A = \Sigma \alpha_{Ai} P'_{Ai}$

$CPI^*_A = \Sigma \alpha_{Ai} P^*_{Ai}$

$$CPI^*_{NA} = P^*_{NA} = E^*/E_o \cdot \beta \cdot \frac{P^T_{NA}}{1 + t_{na}} + (1 - \beta) P^{NT}_{NA}$$

$CPI' = \alpha_A CPI'_A + (1 - \alpha_A) CPI_{NA}$

$CPI^* = \alpha_A CPI^*_A + (1 - \alpha_A) CPI^*_{NA}$

where CPI'_A = Food part of CPI in the absence of direct price interventions

CPI^*_A = Food part of CPI in the absence of direct and indirect price interventions

CPI^*_{NA} = Non-food part of CPI in the absence of direct and indirect price interventions

CPI' = Consumer price index in the absence of direct price interventions

CPI^* = Consumer price index in the absence of direct and indirect price interventions

α_A = Share of food in the total consumption expenditures

β = Share of tradable part of P_{NA}

P'_{Ai} = Price of agricultural product i in the absence of direct price interventions

P^*_{Ai} = Price of agricultural product i in the absence of direct and indirect price interventions

t_{na} = Effect of trade taxes on P^T_{NA}

P^T_{NA} = Index of prices of tradable part of P_{NA}

P^{NT}_{NA} = Index of prices of nontradable part of P_{NA}

Appendix 47a. Absolute Change of Real Income in Rural Area due to Direct Price Intervention

Unit: 1,000 won in 1980 price

	Instantaneous Effect			Short-Run Effect			Cumulative Effect		
	Small-Scale Farmers (0.5ha or less)	Medium-Scale Farmers (0.5-1.5ha)	Large-Scale Farmers (1.5ha or more)	Small-Scale Farmers (0.5ha or less)	Medium-Scale Farmers (0.5-1.5ha)	Large-Scale Farmers (1.5ha or more)	Small-Scale Farmers (0.5ha or less)	Medium-Scale Farmers (0.5-1.5ha)	Large-Scale Farmers (1.5ha or more)
1962	73.9	169.7	340.0	91.9	206.7	430.7	64.1	132.7	246.7
63	51.1	127.6	296.7	71.1	174.5	394.3	81.1	195.5	435.3
64	88.8	208.2	451.8	111.1	260.5	575.4	128.6	299.0	656.3
65	79.8	153.9	313.3	94.9	184.7	390.8	107.6	218.5	465.2
66	28.8	42.8	42.9	31.5	48.2	55.4	57.3	99.9	174.6
67	11.9	14.1	8.9	8.8	12.9	14.9	34.4	60.4	85.9
68	5.5	24.8	47.5	46.2	133.1	333.3	52.4	60.9	125.7
69	37.4	93.4	188.7	44.6	111.6	241.9	53.8	129.8	270.9
70	40.1	99.0	202.4	51.5	125.0	282.2	61.5	145.2	320.3
71	81.1	240.8	484.6	103.6	295.4	615.2	109.1	312.5	648.6
72	103.0	355.6	695.2	135.6	440.7	885.8	120.1	505.6	1,004.5
73	191.5	462.5	1,006.7	115.0	527.9	1,193.1	237.9	573.8	1,288.0
74	220.6	476.8	964.2	249.4	543.2	1,122.0	279.5	610.8	1,261.2
75	90.5	185.4	323.4	102.6	215.8	413.6	158.4	340.8	653.8
76	69.3	263.1	556.5	102.1	345.3	775.9	138.6	444.7	921.2
77	149.0	76.8	1,316.6	266.5	885.5	2,139.7	210.4	730.7	1,761.8
78	300.4	838.4	1,851.5	357.0	992.9	2,257.4	348.3	987.9	2,272.1
79	289.9	869.0	1,846.0	337.9	983.3	2,100.9	344.5	994.4	2,142.3
80	252.8	735.8	1,550.9	284.6	819.7	1,741.6	275.0	797.2	1,732.1
81	241.5	878.9	1,925.1	276.2	974.6	2,161.9	262.3	941.2	2,141.7
82	299.1	925.8	1,838.4	349.3	1,051.8	2,174.5	315.2	1,012.9	2,152.7
83	404.6	798.6	1,694.4	468.8	917.3	2,047.9	439.7	842.1	2,000.8
84	436.1	915.1	1,708.2	495.5	1,054.1	2,045.6	412.8	1,039.7	2,142.8

Appendix 47b. Absolute Change of Real Income in Rural Area due to Total Price Intervention

Unit: 1,000 won in 1980 prices

Year	Instantaneous Effect			Short-Run Effect			Cumulative Effect		
	Small-Scale Farmers (0.5ha or less)	Medium-Scale Farmers (0.5-1.5ha)	Large-Scale Farmers (1.5ha or more)	Small-Scale Farmers (0.5ha or less)	Medium-Scale Farmers (0.5ha or	Large-Scale Farmers (1.5ha or more)	Small-Scale Farmers (0.5ha or less)	Medium-Scale Farmers (0.5-1.5ha)	Large-Scale Farmers (1.5ha or more)
1962	70.4	25.1	-90.6	59.3	-17.8	-198.7	59.3	-17.8	-189.7
63	78.6	14.5	-42.7	71.9	-6.3	-94.4	61.1	-33.0	-155.0
64	5.9	-153.7	-494.9	-10.2	-197.1	-583.2	-19.3	-226.4	-656.8
65	4.4	-105.0	-374.7	-6.7	-133.6	-448.4	-17.7	-164.5	-524.7
66	-33.6	-199.5	-539.7	-61.0	-268.8	-700.4	-78.8	-312.6	-793.6
67	-129.4	-270.6	-656.5	-99.9	-349.4	-806.3	-122.2	-405.4	-930.9
68	-60.0	-247.7	-637.7	-104.1	-345.8	-846.9	-149.2	-441.6	-1,045.0
69	-32.6	-198.3	-425.9	-63.7	-274.7	-711.9	-117.6	-390.5	-938.6
70	38.1	3.9	-25.3	-25.9	-165.0	-432.6	-78.3	-271.6	-628.0
71	27.5	-19.9	-79.1	20.9	-31.5	-106.5	-17.2	-117.0	-260.9
72	31.6	116.3	264.4	48.5	157.9	340.5	31.3	121.0	276.8
73	82.3	171.7	355.6	102.0	218.2	454.0	100.4	215.9	456.6
74	222.7	373.8	682.7	247.0	432.5	813.9	241.0	417.0	773.5
75	59.3	-8.6	-148.9	37.9	-65.4	-271.5	51.0	-30.8	-201.3
76	-55.8	-55.7	-44.2	-57.5	-52.8	-22.4	-56.6	-53.8	-26.1
77	66.0	378.4	983.2	107.1	485.6	1,224.4	111.1	498.6	1,249.2
78	292.5	801.9	1,817.3	340.4	922.0	2,079.2	356.0	957.9	2,154.5
79	340.2	889.6	1,825.9	382.5	977.7	2,032.3	403.5	1,022.4	2,116.9
80	293.3	699.7	1,454.5	323.6	770.6	1,602.0	349.2	826.2	1,709.8
81	227.9	741.3	1,663.2	257.8	825.1	1,752.0	287.6	904.0	1,929.3
82	246.6	750.6	1,573.3	278.7	843.0	1,769.9	316.3	935.7	1,949.7
83	321.3	657.3	1,496.0	361.8	745.7	1,705.6	393.5	812.5	1,862.3
84	366.3	792.9	1,539.7	404.9	939.7	1,770.0	428.0	989.1	1,944.3

Appendix 48. Migration of Agricultural Labor Force[a/]

Period	Growth Rate of Labor Force	Share of Labor Force		Natural Growth Rate of Agri. Labor Force[b/]				Simple Average Annual Migration[c/]				Rate of Migration[d/]			
		Agriculture	Non-Agri.	a=1	a=1/4	a=1/3	a=1/2	a=1	a=1/4	a=1/3	a=1/2	a=1	a=1/4	a=1/3	a=1/2
	(N)	(Q_1)	(Q_2)	(N1A)	(N1B)	(N1C)	(N1D)	(MA)	(MB)	(MC)	(MD)	MRA	MRB	MRC	MRD
1960-64	.118	.621	.379	.118	.143	.139	.133	38.4	68.5	64.5	57.0	.0077	.0138	.0130	.0115
1965-69	.171	.569	.431	.171	.219	.204	.195	158.2	208.4	192.8	183.0	.0309	.0407	.0377	.0358
1970-74	.222	.502	.498	.222	.273	.266	.254	130.5	184.4	177.2	163.8	.0237	.0334	.0321	.0297
1975-79	.181	.425	.575	.181	.222	.216	.206	279.6	326.4	320.2	308.6	.0500	.0583	.0572	.0551
1980-84	.051	.322	.678	.051	.061	.059	.057	338.5	349.2	347.8	345.2	.0719	.0741	.0738	.0733

Source: Ministry of Agriculture and Fisheries, Statistics Yearbook, various issues.
Economic Planning Board, Labor Statistics Yearbook, various issues.

a/ The methodology to obtain the migration series was developed by Y. Mundlak's Intersectoral Factor Mobility and Agricultural Growth, IFPRI Research Report No.6, Feb. 1979.

b/ $N1_i = N / [1 - (1 - a) Q1Q2]$, i = A, B, C, and D.
where $a = N2/N1$ when the entire labor force is assumed to be in agriculture.

c/ $M_i = \frac{1}{t} [(1 + N1_i) LF1_0 - LF_t]$, i = A, B, C, and D.
where LF1 is agricultural labor force.

d/ $MR_i = M_i / [(LF1_0 + LF1_t)/2]$, i = A, B, C, and D.

Appendix 49. Determination Procedures of Rice Purchase Price, Selected Years 1965-80

Unit: won/80kg bag

Crop Year	Information Referred to (won)		Criteria Adopted (won)		Purchase Price (won)	Rate of Increase (%)
1965	1. Agricultural parity ratio (1960=100)	2,987	1. International price	3,000	3,150	4.9
	2. Production cost	2,325	2. Incentive bonus	150		
	3. International price	3,000				
1970	1. Agricultural parity ratio (1965=100)	5,881	1. Agricultural parity ratio	5,881	7,000	35.9
	1965-69 increases in:		2. Incentive bonus	1,119		
	2. WPI	5,562				
	3. CPI	5,738				
	4. PPFI	5,881				
	5. Rice farm price	5,675				
1975	1. Agricultural parity ratio (1975=100)	18,354	1. Increases in: WPI	18,329	19,500	23.7
	1974-75 increases in:		Agricultural parity ratio	18,354		
	2. Price of non-food items	17,646	2. Incentive bonus	1,150		
	3. WPI	18,329				
	4. PPFI	17,998				
	5. Agricultural supply prices	17,982				
1980	1. Agricultural parity ratio (1977=100)	51,399	Increase in wholesale price of rice		45,750	25.0
	2. Increase in GNP deflator 1977/1978	44,100				
	1979-80 increases in:					
	3. WPI	49,739				
	4. CPI	47,617				
	5. Wholesale price of rice	45,530				
	6. Production cost	43,920				

Source: Ministry of Agriculture and Fisheries, Food Bureau, various issues.

Appendix 50. Government Share in Rice Marketing and Rate of Seasonal Price Variations, 1960-84

Unit: 1,000 MT

Rice Year	Total Production[a/]	Government Purchase[a/]	Government Sales[b/]	Government Share (%)	Rate of Price Variation[c/] (%)
1960	3,149	198	76	5.4	25.2
1961	3,046	141	20	-	25.0
1962	3,463	309	94	-	24.0
1963	3,015	278	264	22.2	23.2
1964	3,758	224	74	5.4	21.4
1965	3,954	240	94	5.0	18.3
1966	3,501	302	217	12.2	15.1
1967	3,919	355	285	13.5	11.7
1968	3,603	286	442	21.7	9.0
1969	3,195	156	681	30.4	7.6
1970	4,090	326	749	29.6	6.7
1971	3,939	365	1,181	44.3	6.7
1972	3,998	517	589	29.5	6.5
1973	3,957	507	606	30.3	2.3
1974	4,212	480	972	46.3	7.5
1975	4,445	735	553	24.6	4.4
1976	4,669	789	848	39.1	9.0
1977	5,215	1,043	606	23.2	4.4
1978	6,006	1,404	1,183	39.4	8.3
1979	5,797	1,355	1,683	49.5	4.2
1980	4,565	1,301	1,742	50.0	7.8
1981	3,551	546	1,560	41.3	8.0
1982	5,063	915	694	36.7	6.5
1983	5,175	1,091	911	33.6	5.2
1984	5,404	1,219	832	32.1	3.8

Source: Computed from Ministry of Agriculture and Fisheries, Yearbook of Agriculture and Fisheries Statistics, various issues.

a/ Production and acquisition of the previous year.

b/ Excludes rice sold to the armed forces and other government institutions, but includes imported rice.

c/ $\frac{\text{(highest monthly price) - (lowest monthly price)}}{\text{(annual average price)}} \times 100$

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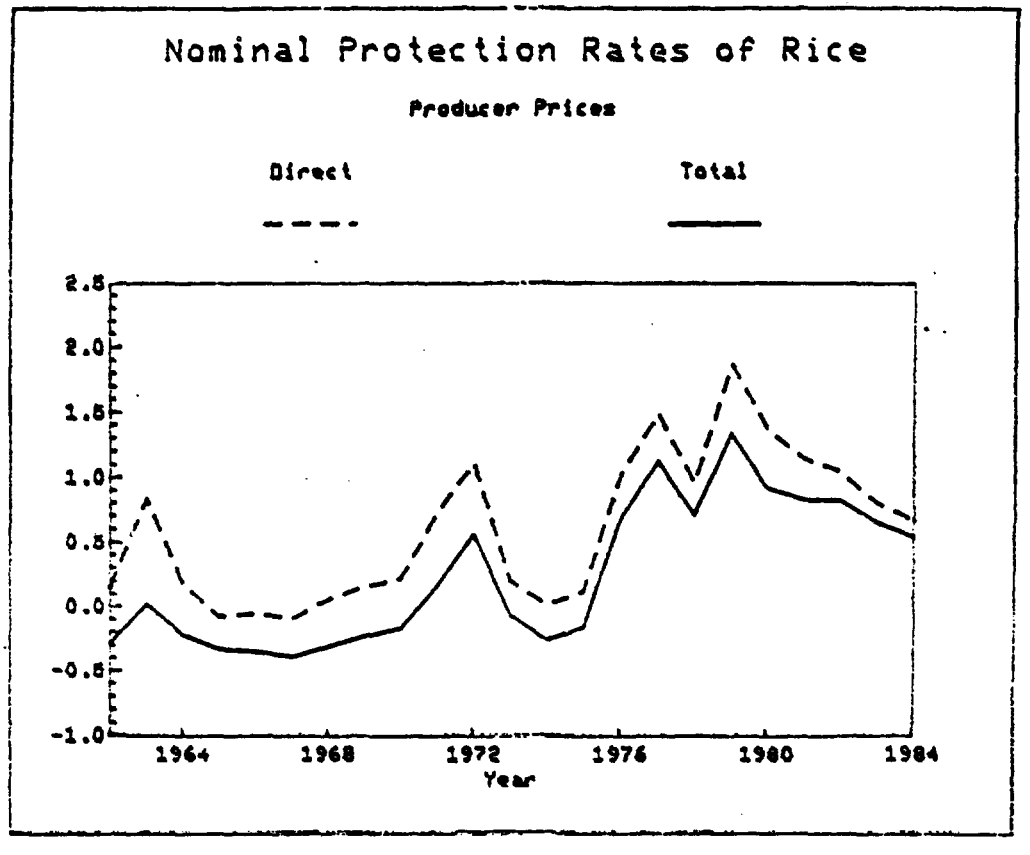

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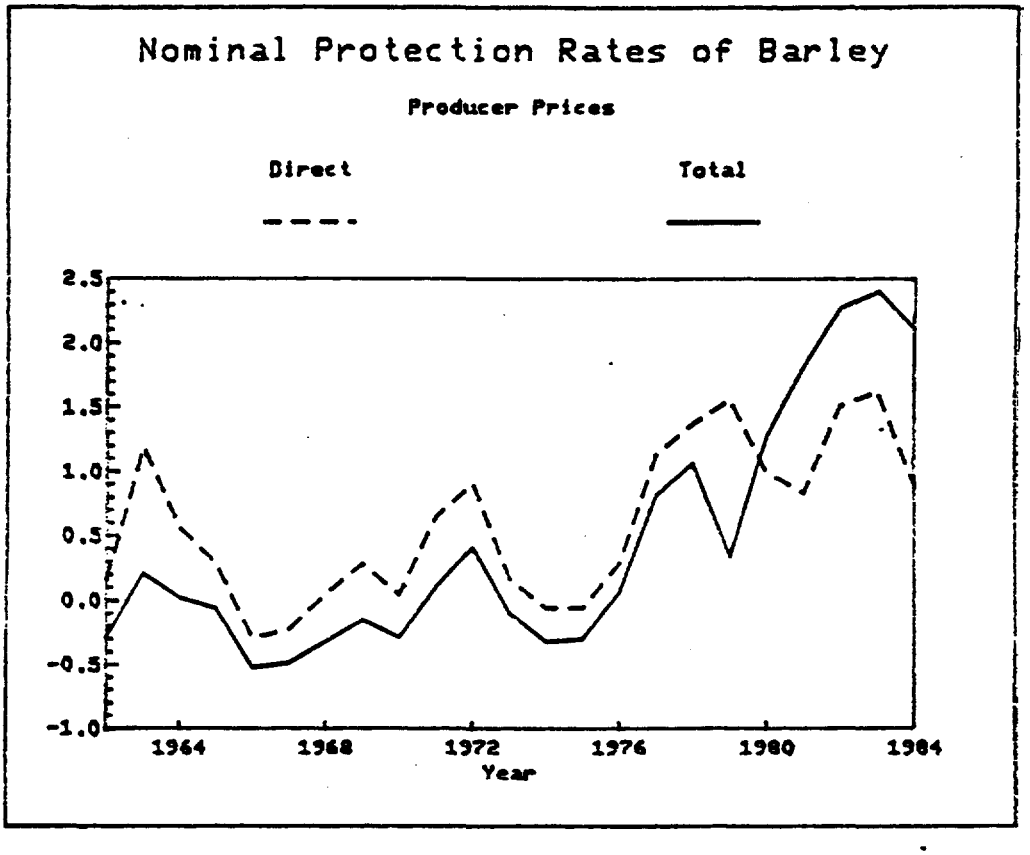

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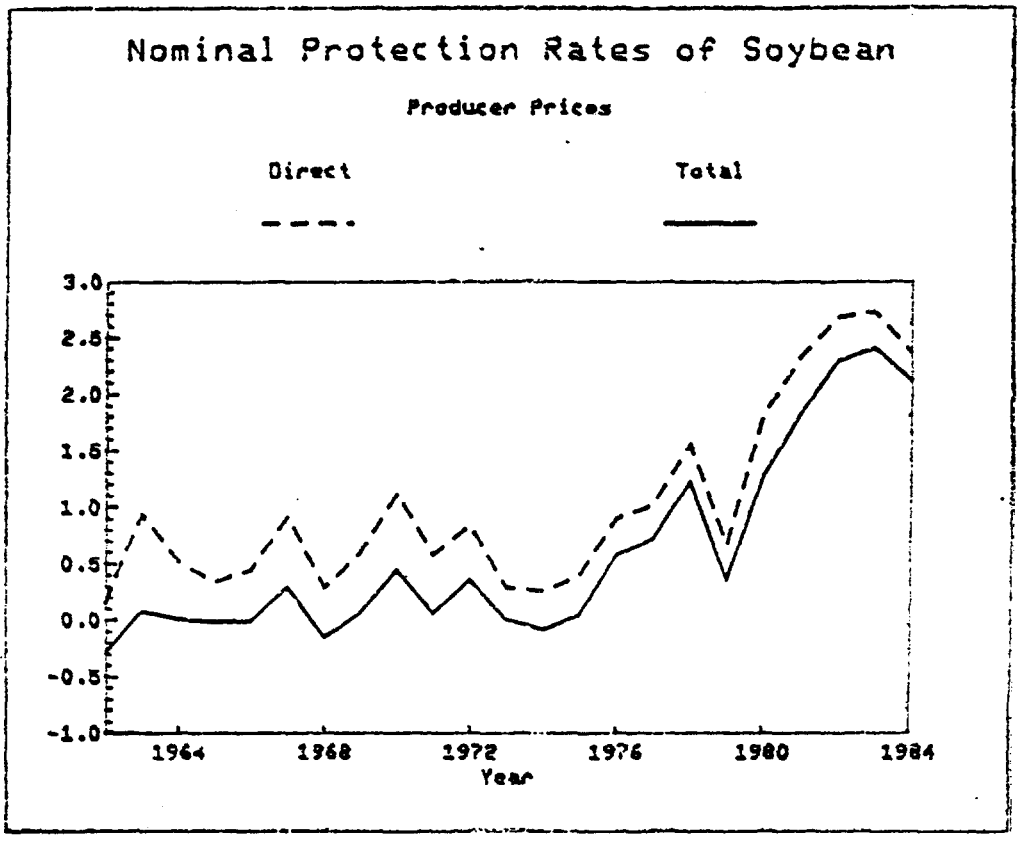

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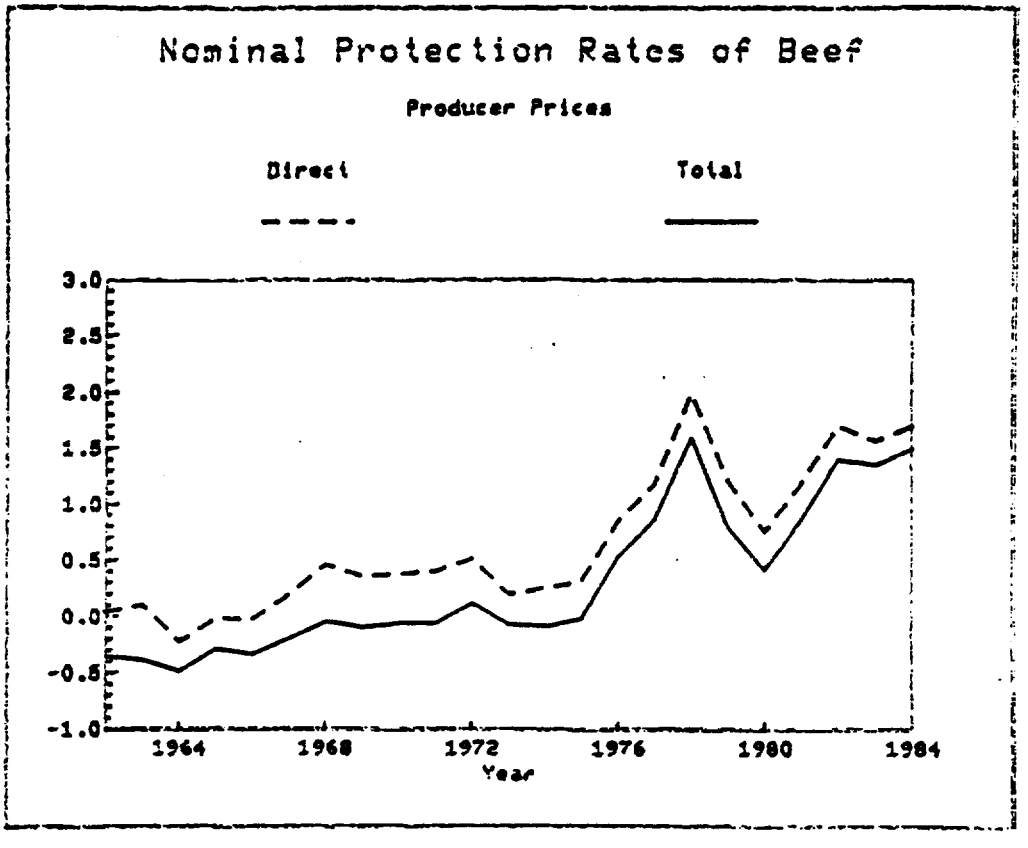

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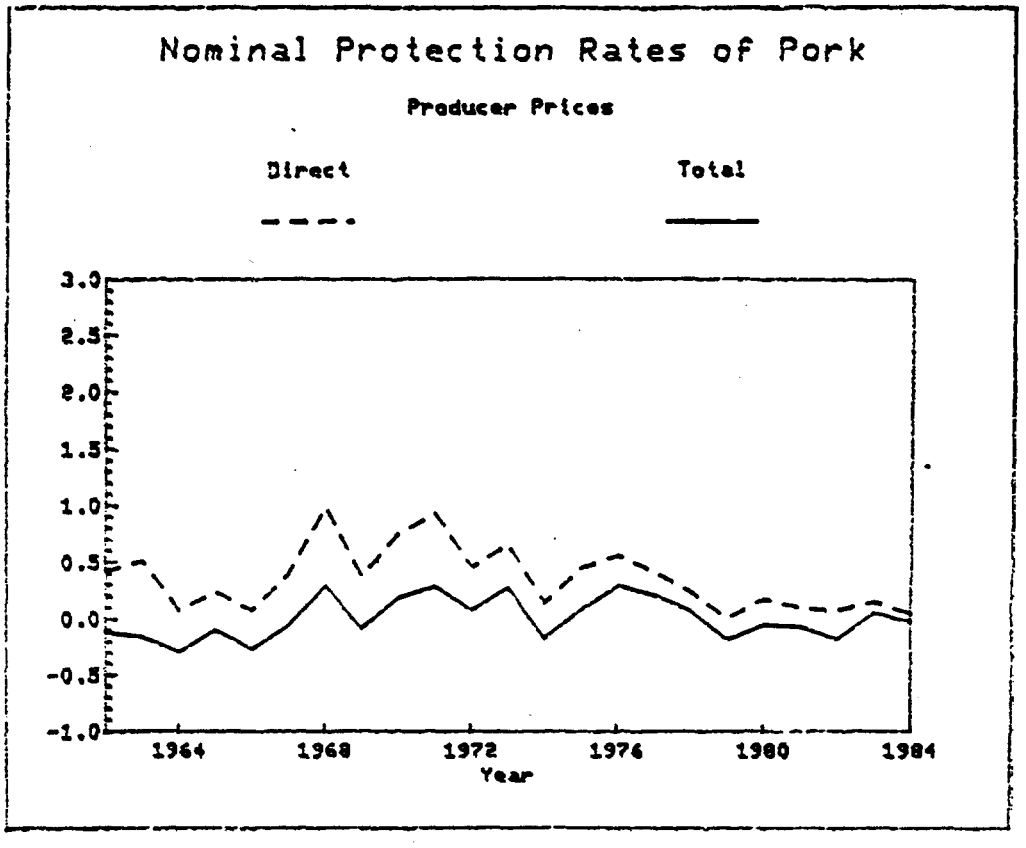

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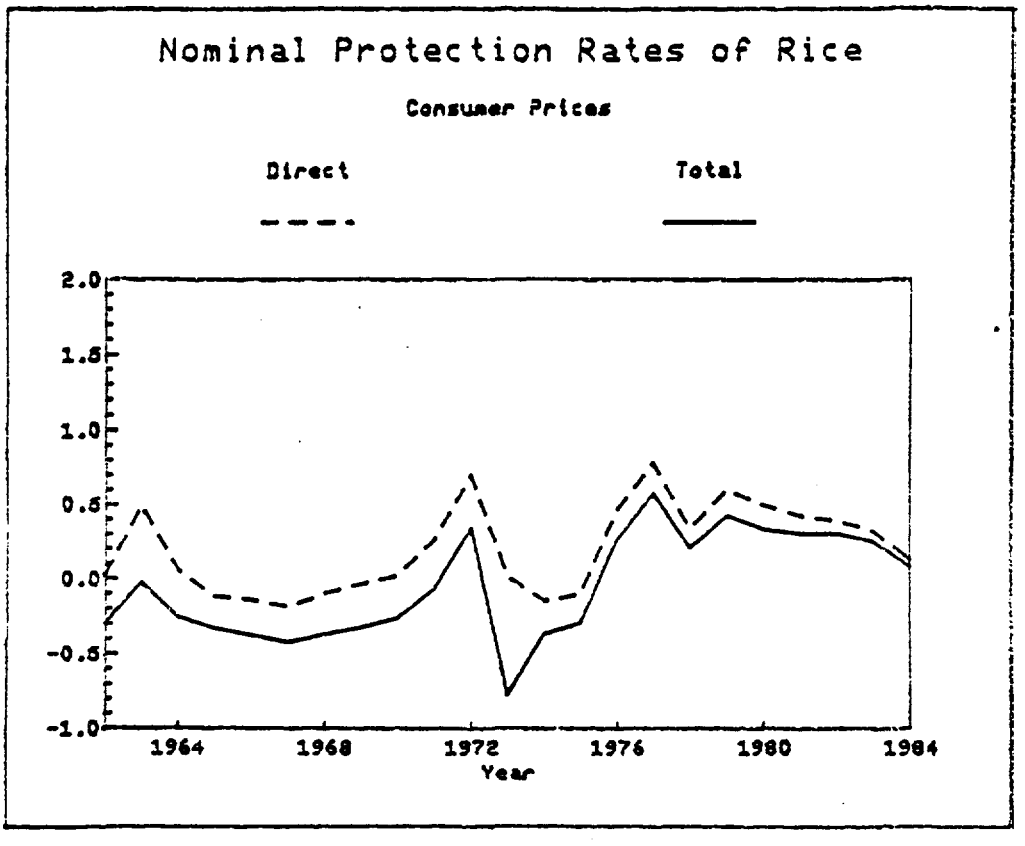

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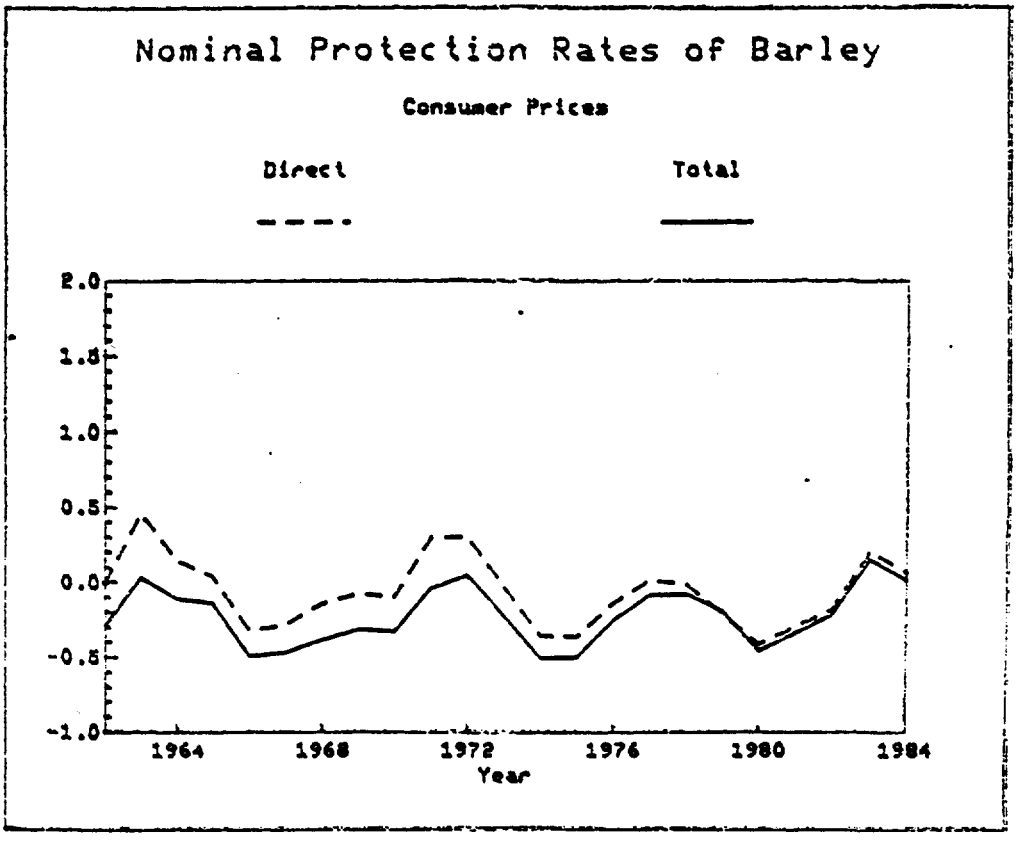

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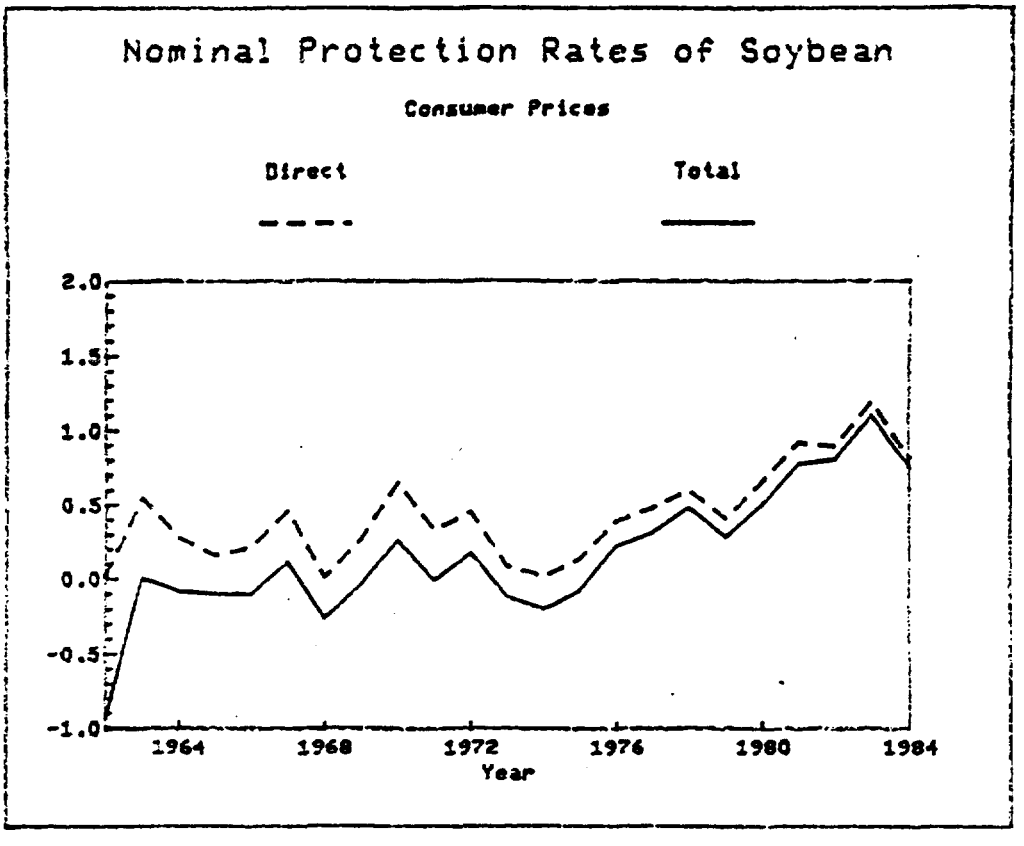

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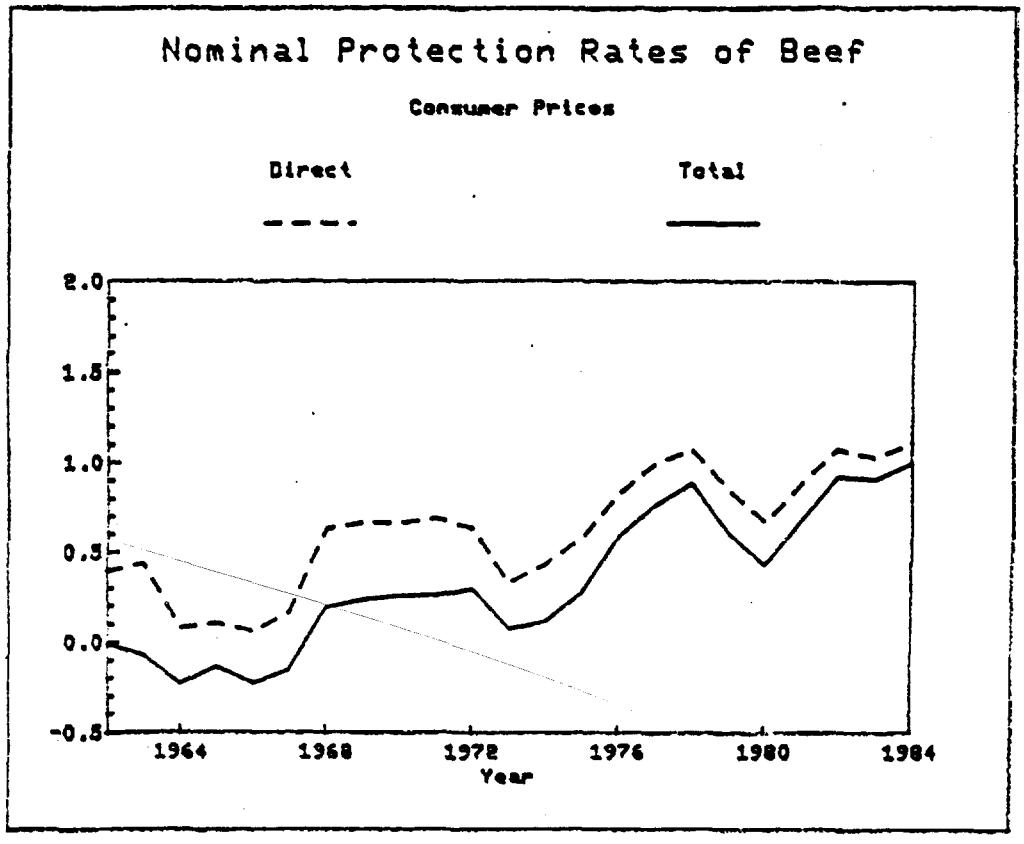

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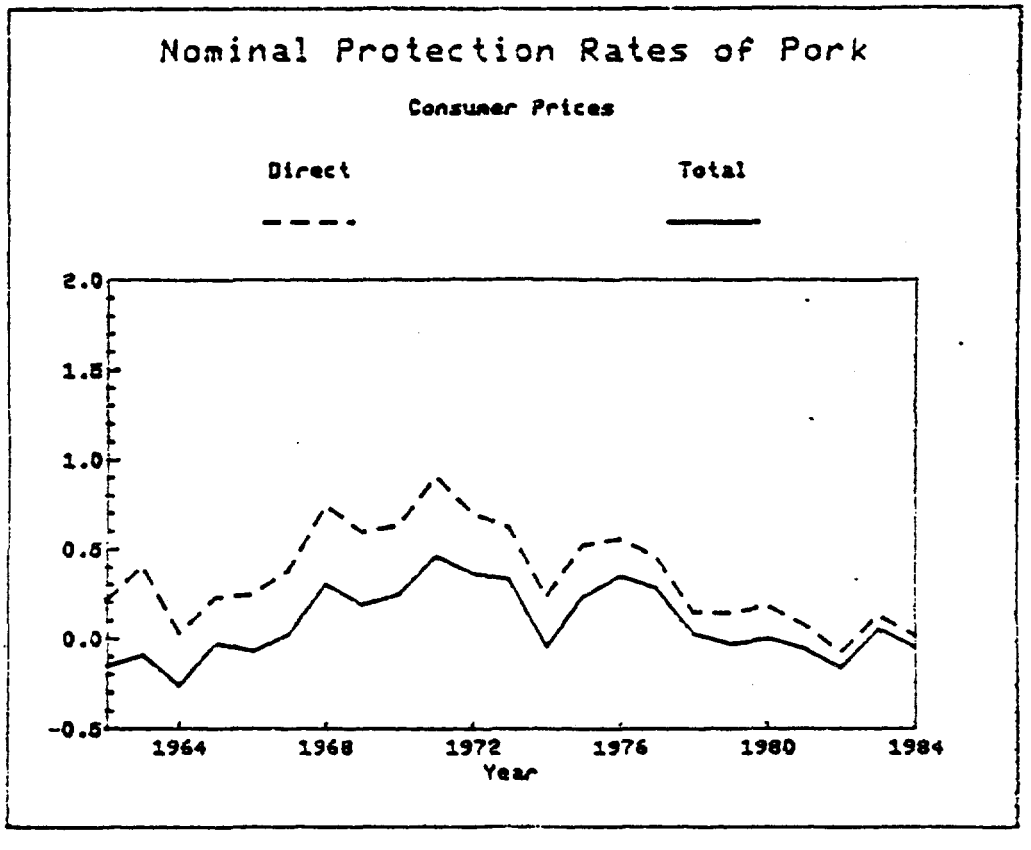

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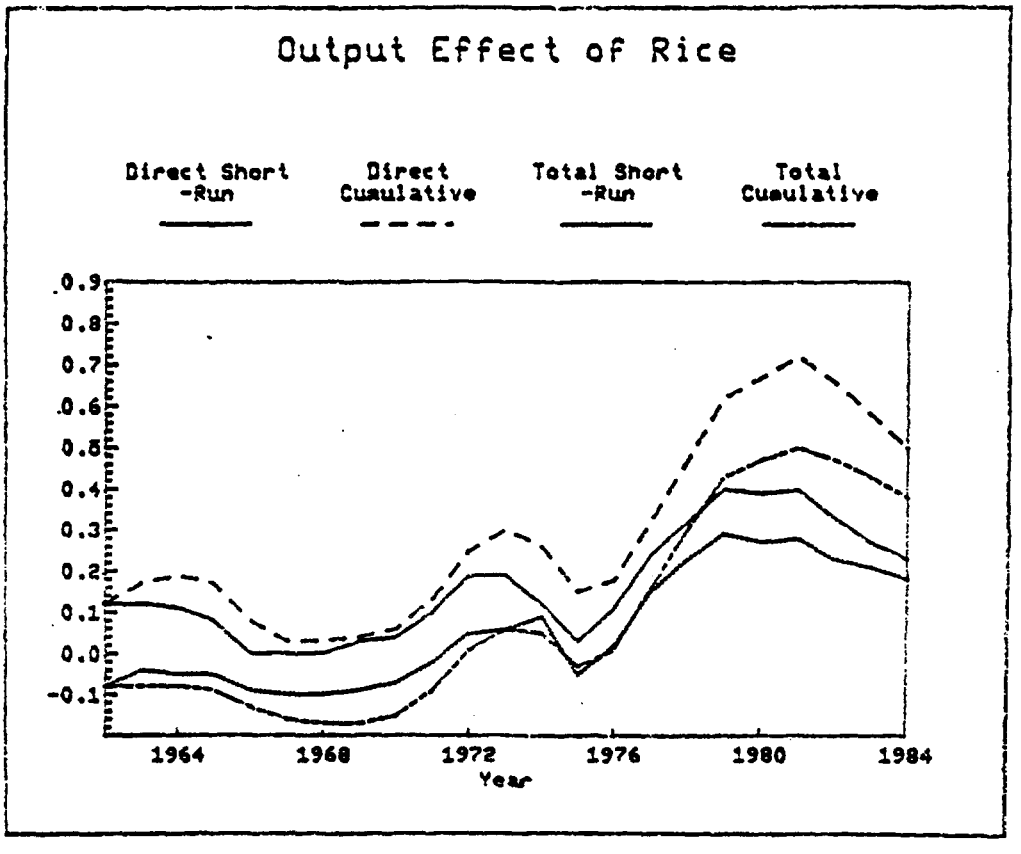

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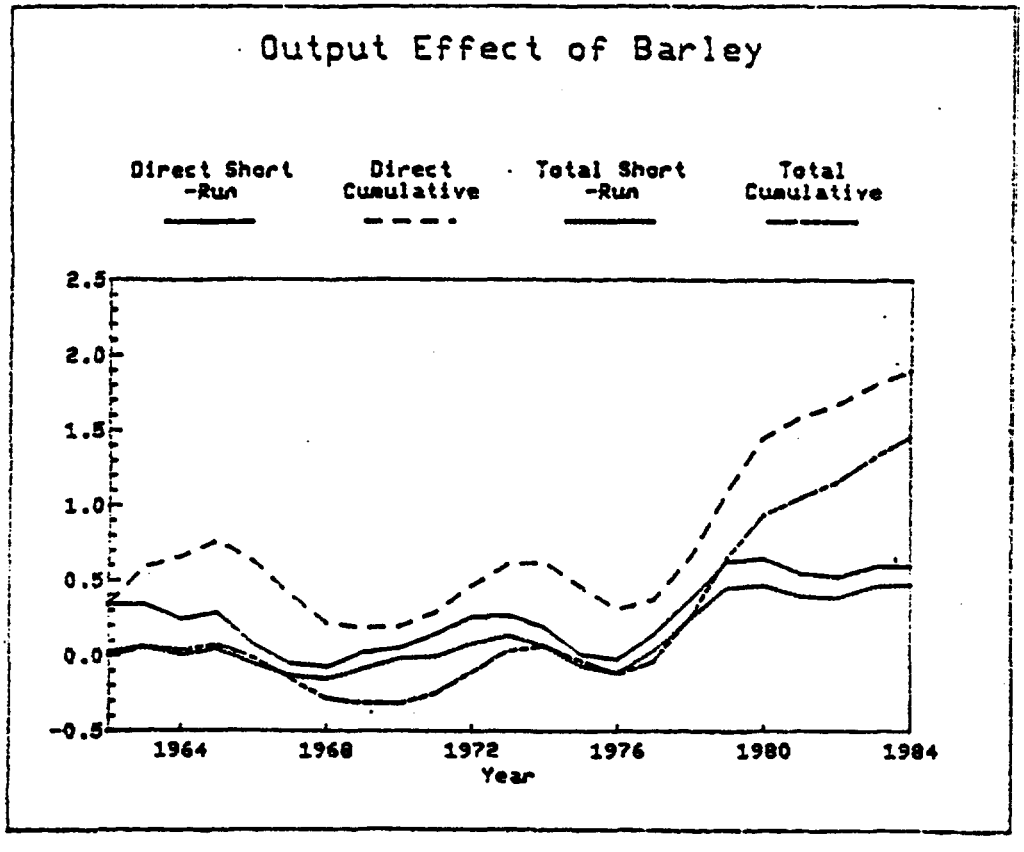

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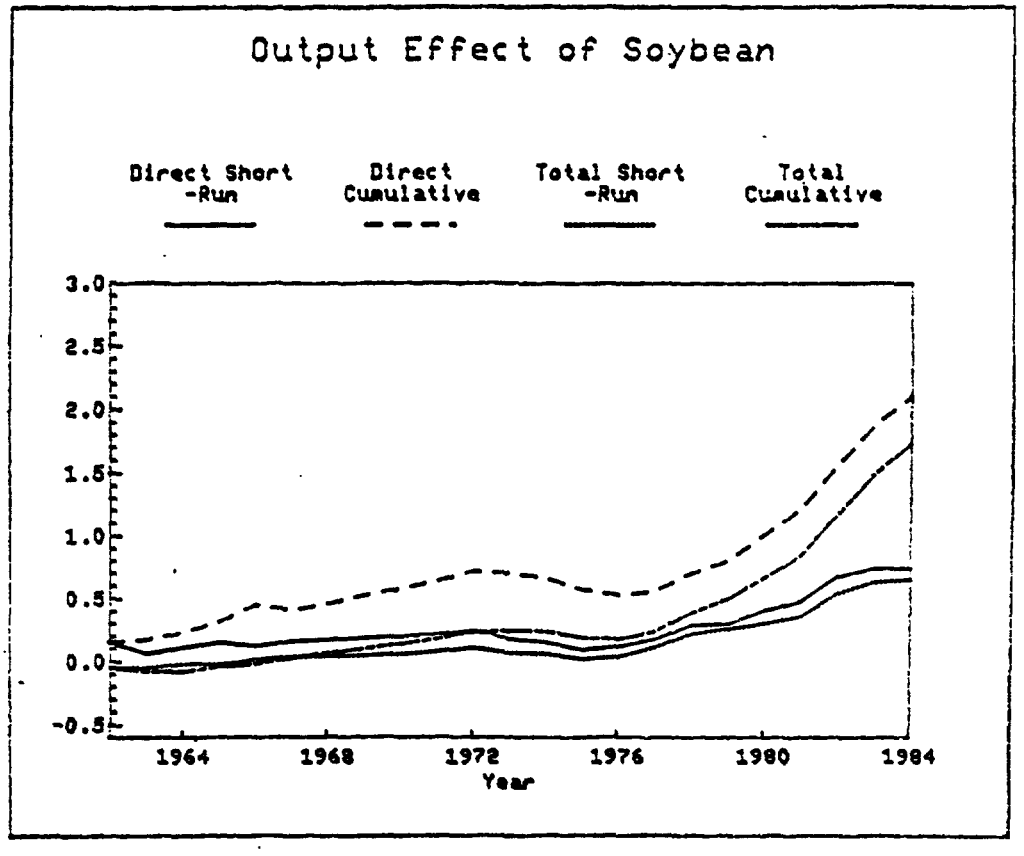

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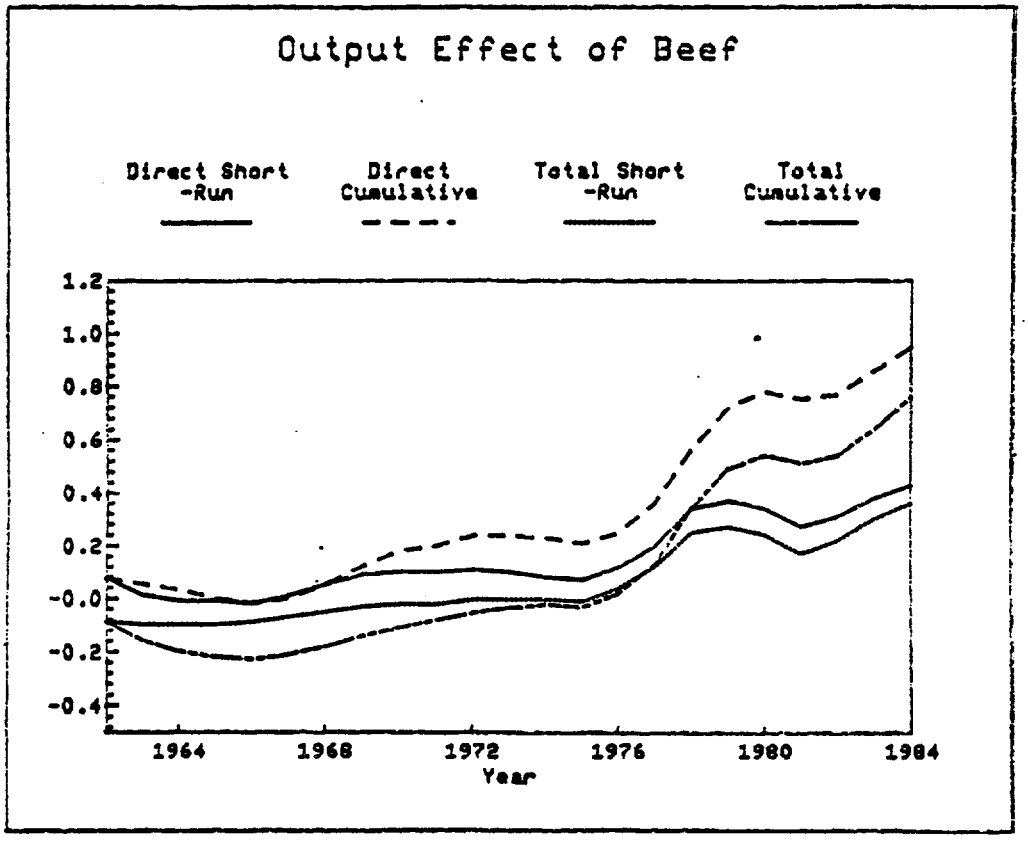

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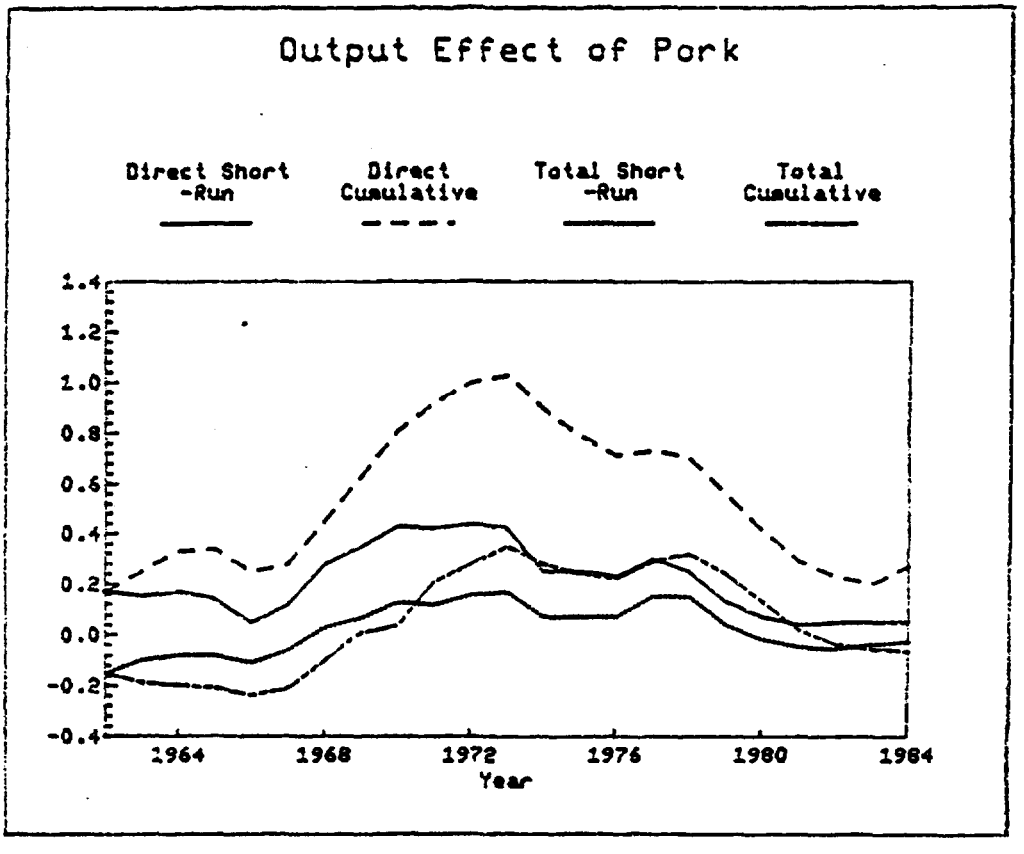

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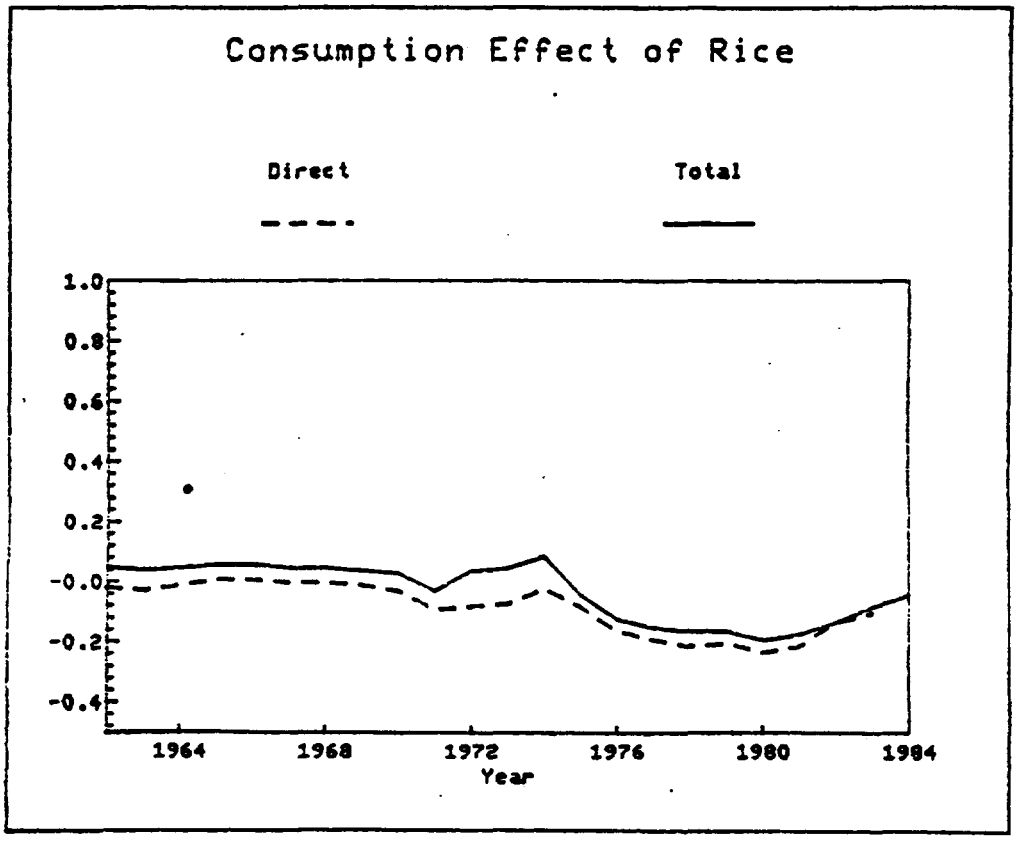

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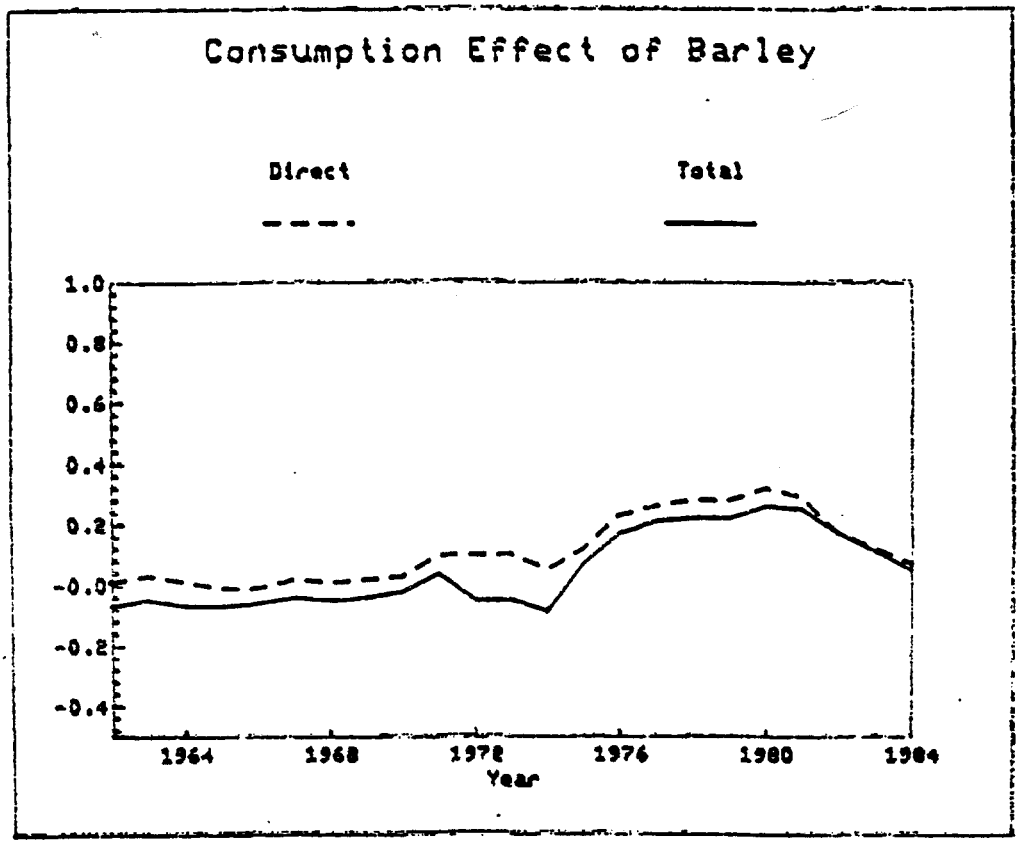

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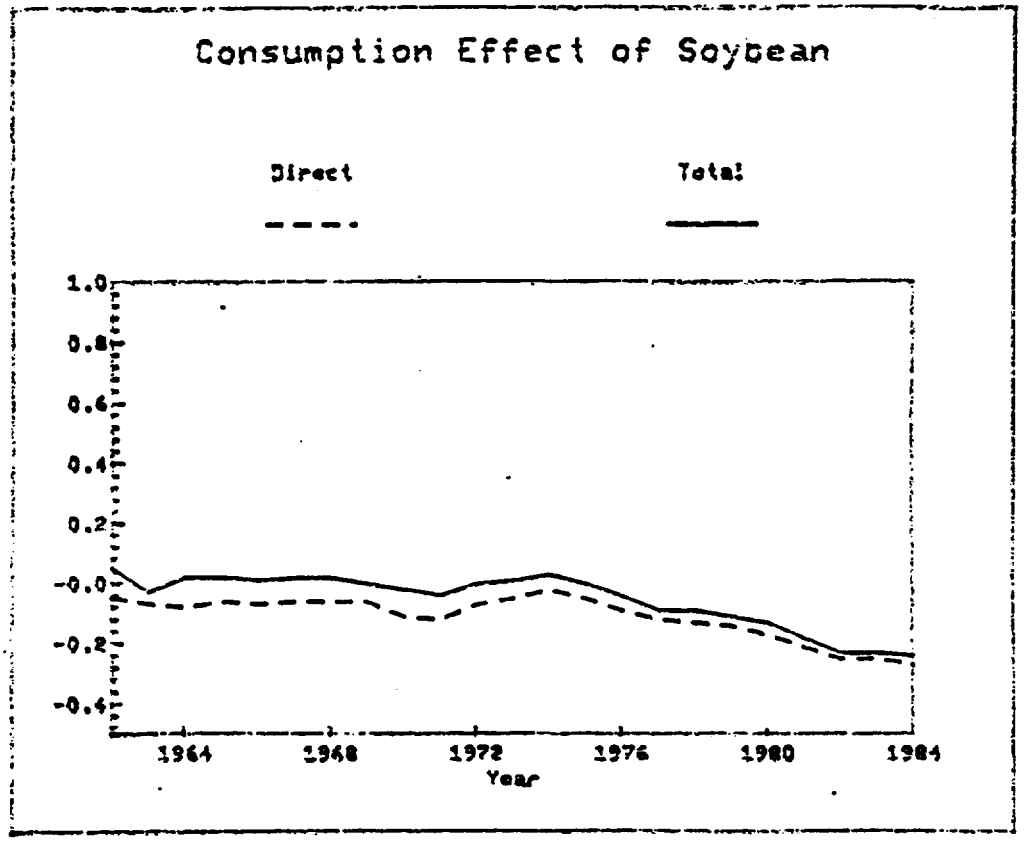

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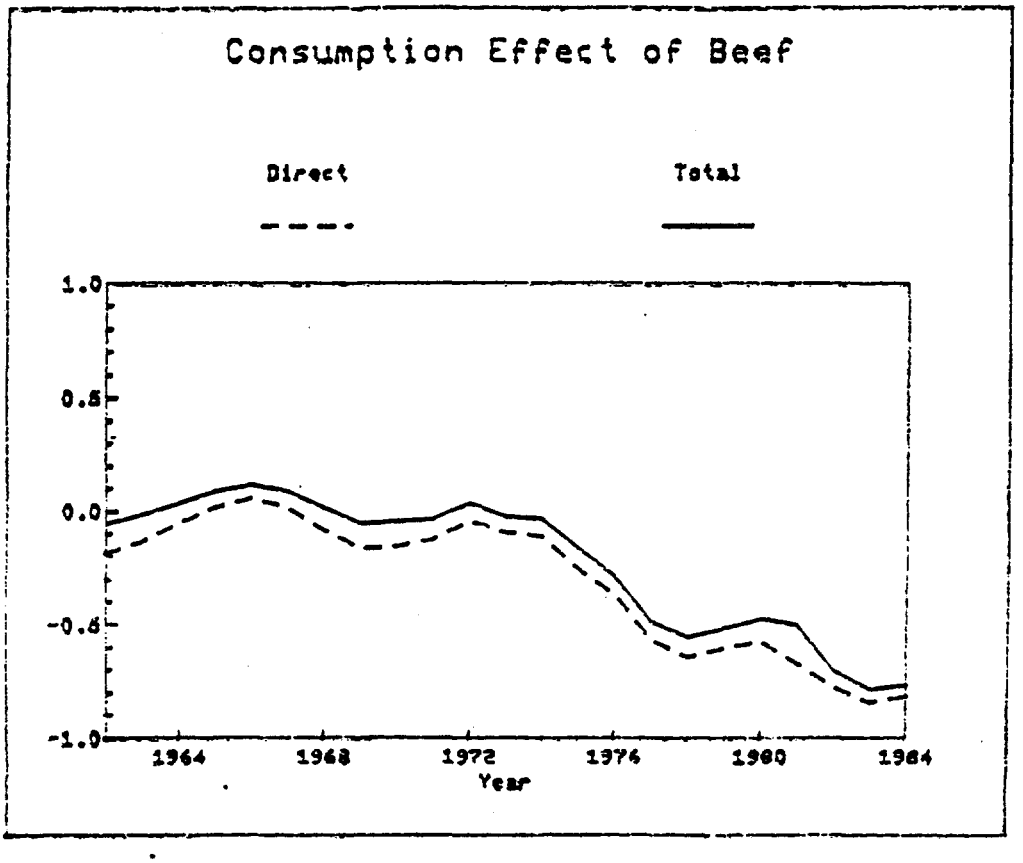

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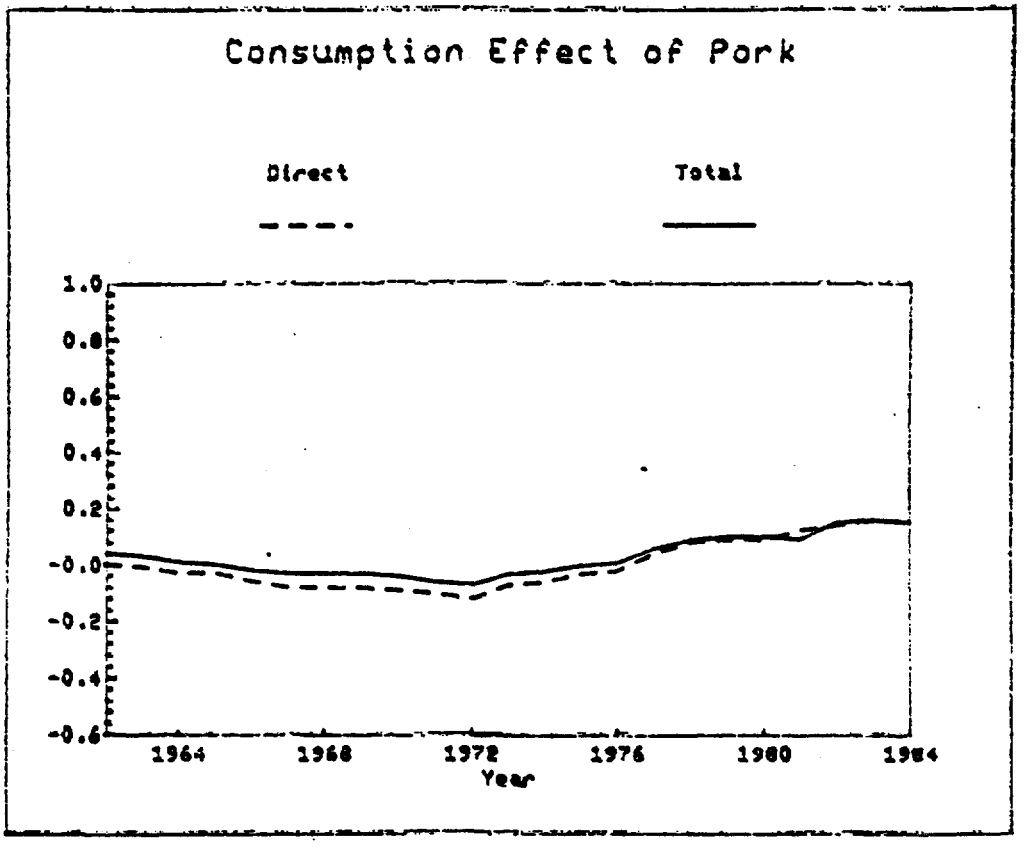

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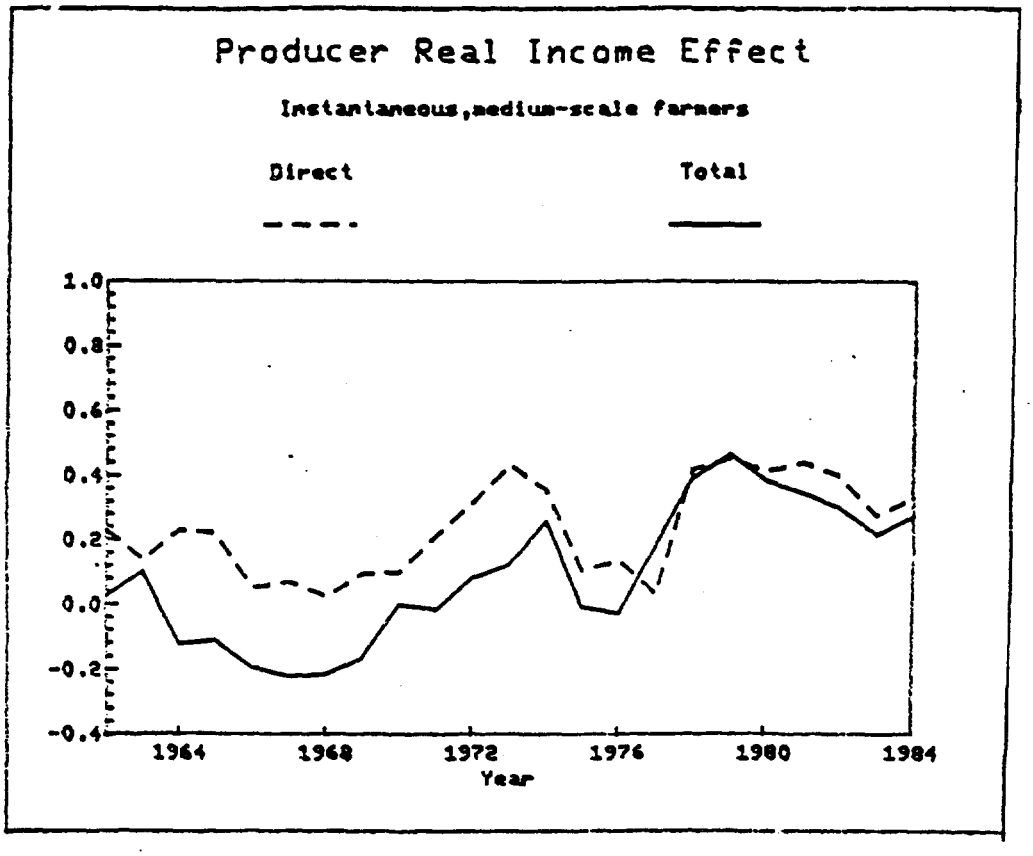

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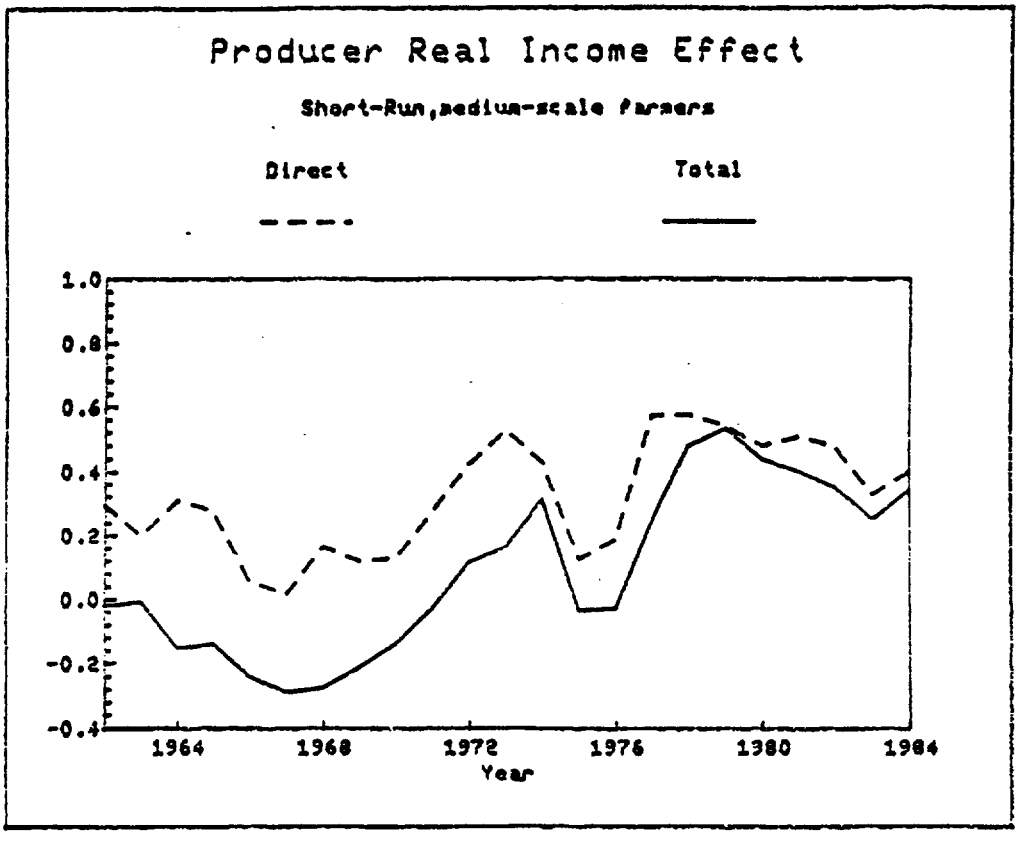

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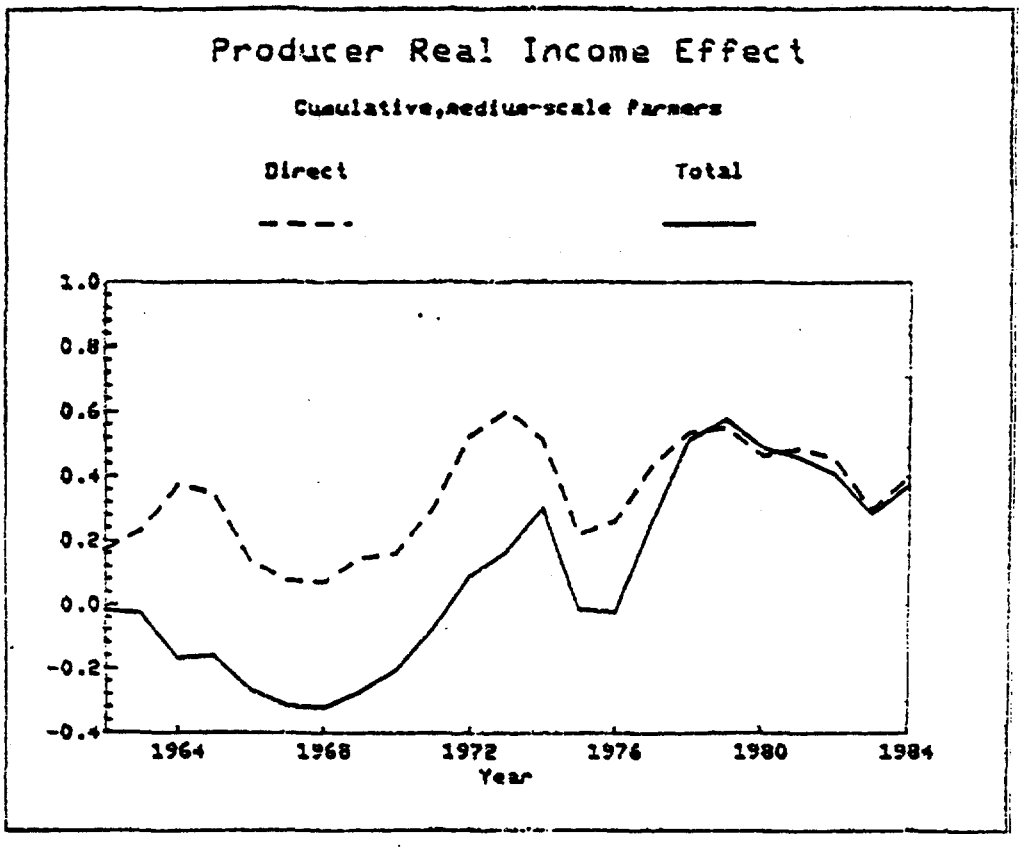

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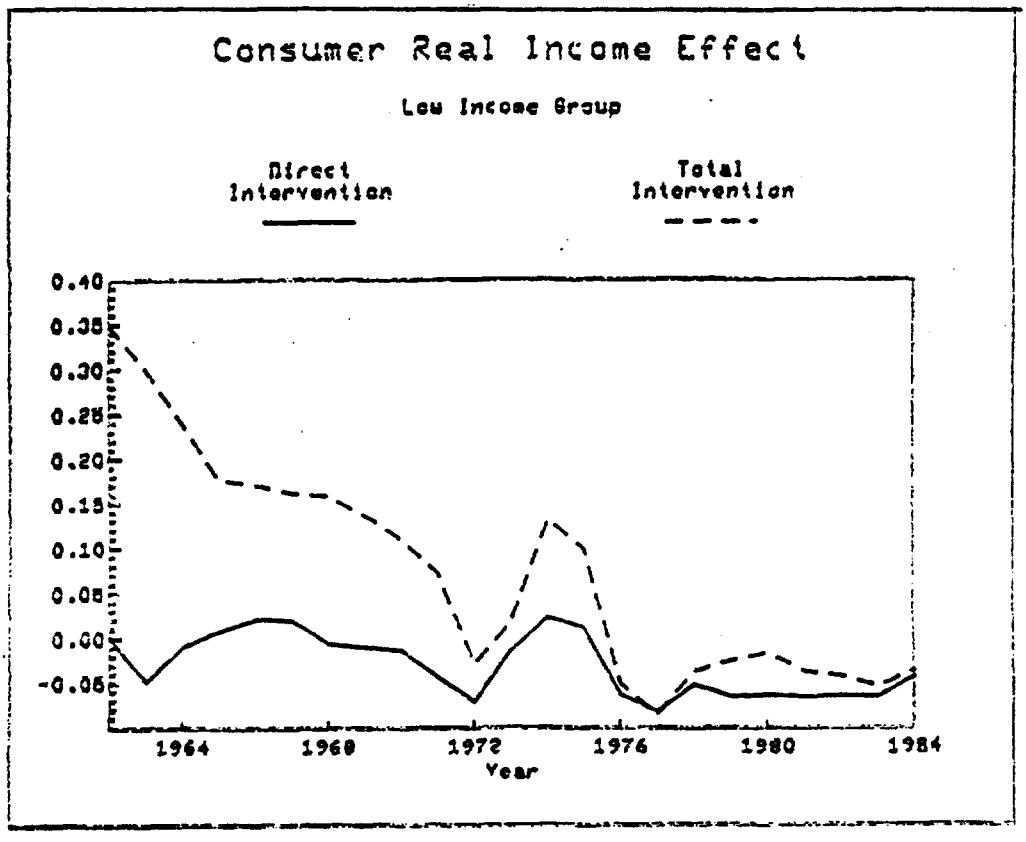

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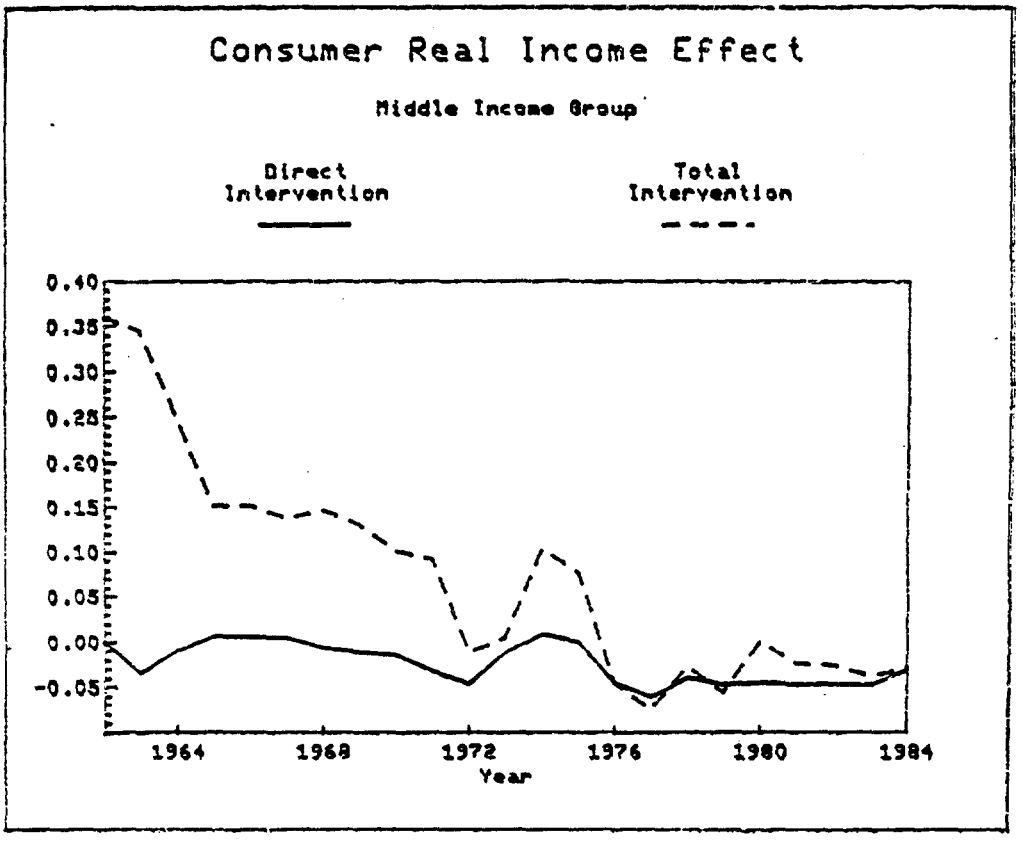

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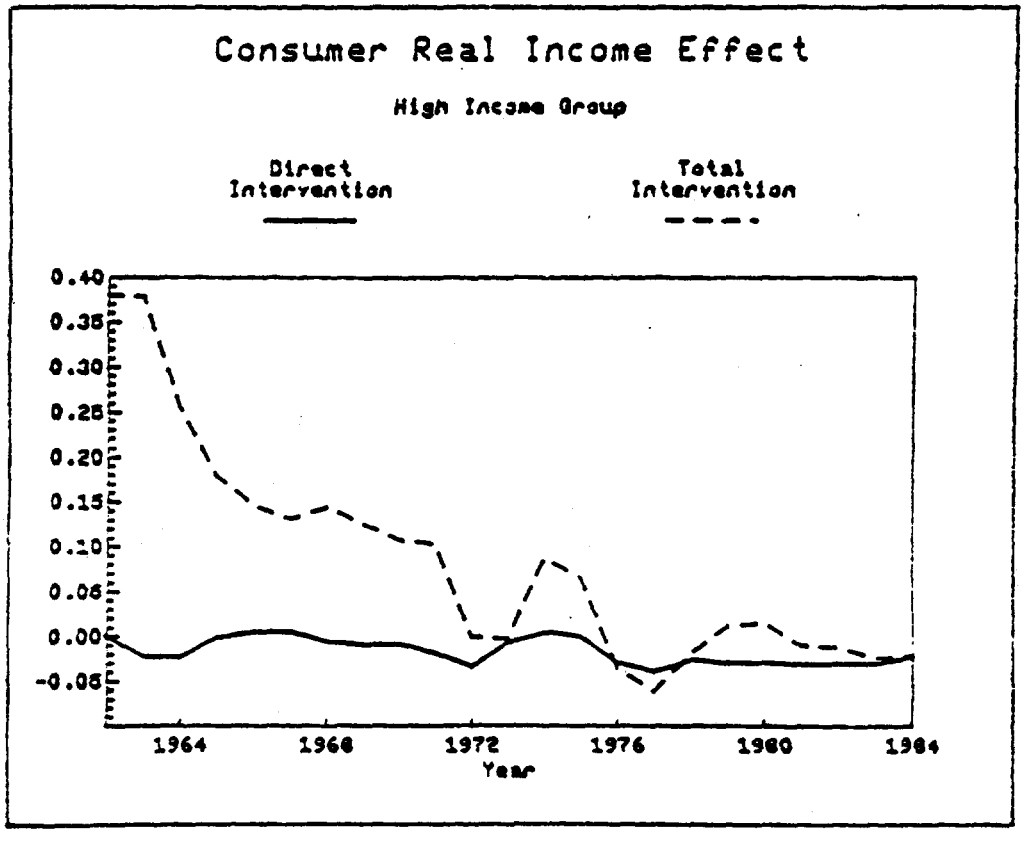

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